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ABSTRACT

This is the second volume in a series that includes the syllabi for the advanced elective courses in the New York state art program for grades 10, 11, and 12. The first volume is described in ED 100 747. The guide consists of the following three sections: (1) Studio in Ceramics, (2) Studio in Sculpture, and (3) Studio in Jewelry and Silversmithing. Teaching techniques include teacher demonstrations, classroom discussion, hands-on experiences and creative artistry, and a variety of other three-dimensional art forms. A description, student objectives, background reading for teachers and students, and suggestions for teacher demonstrations, classroom discussions, and student activities are provided for each section. Evaluation methods and suggested supplementary readings are also included. (Author/JR)

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sculpture
ceramics
jewelry

volume two
advanced elective courses in art for grades 10, 11, or 12

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FOREWORD

This is the second volume in a series that includes the syllabuses for the advanced elective courses in the art program for grades 10, 11, and 12.

Volume II
Studio in Ceramics
Studio in Jewelry and Silversmithing
Studio in Sculpture

Volume I
Studio in Drawing and Painting
Studio in Graphic Arts
Studio in Photography

Volume III
Studio in Advertising Design
Studio in Fashion Design and Illustration
Studio in Product Design
Studio in Stage Design

As with the other electives, those in this volume may be offered for one unit of credit to students who have earned credit in the basic course, *Studio in Art*. This credit may be applied as part of the three-unit, major sequence in art. See the flow-chart of the art program on page vi in *Studio in Art*.

The following consultants were involved:

Studio in Ceramics was written by Ernest Andrew Mills and Brita Walker, art teacher at the Milne School, State University of New York at Albany (now retired). Phyllis B. Nelson, art director, East Meadow School District, and Anthony Volpe, art teacher at Mahopac High School, reviewed and made additions to the manuscript.

Studio in Jewelry and Silversmithing was written by Susan Wisherd, chairman, Department of Art Education, State University College at New Paltz.

Studio in Sculpture was written by Ernest Andrew Mills. Minerva Markey provided material used in several areas of the course of study. The manuscript was reviewed by Phillip Savino, chairman of the art department, Deer Park High School.

The new syllabuses were prepared under the general direction of Vincent J. Popolizio, chief, Bureau of Art Education. The draft materials prepared by the writing consultants indicated above were supplemented and revised by Mr. Mills, and Harold Laynor, formerly associate in Art Education, now on the faculty of Millersville State College, Pennsylvania. The layout of the publication was planned by James V. Gilliland, associate in Art Education.

The curriculum responsibility for preparing the preliminary drafts for publication was carried out by Richard G. Decker, formerly associate in Secondary Curriculum, now retired. Robert F. Zimmerman, associate in Secondary Curriculum, coordinated the final revisions and prepared the materials for publication.

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Director, Division of
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Exploring the Visual Arts

An exploratory course intended to meet the general art requirement for students in grades 7 and 8 by enabling them to experiment with the various forms and media of the visual arts in the contemporary world

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A year-long introduction to the fundamentals of 3-dimensional design through the creation of crafts in various materials

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A year-long introduction to the nature, function, and techniques of the visual arts in the present and in the past

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A year-long introduction to man's creative use of the visual arts throughout history, with constant reference to the present and implications for the future

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A year-long introduction to a universal graphic language through which students can express their ideas with creativity, clarity, and exactness

ADVANCED ELECTIVE COURSES*

- Studio in Ceramics
- Studio in Sculpture
- Studio in Jewelry and Silversmithing
- Advanced Creative Crafts
- Independent Study

- Studio in Drawing and Painting
- Studio in Graphic Arts
- Studio in Advertising Design
- Studio in Fashion Design and Illustration
- Studio in Jewelry and Silversmithing
- Studio in Product Design
- Studio in Stage Design
- Studio in Interior Design
- Studio in Sculpture
- Studio in Ceramics
- Studio in Photography
- Cinematography
- Independent Study

- Ancient Art
- European Art
- NonEuropean Art
- Modern Art
- Art of the Americas
- Architecture Through the Ages
- Esthetics and Art Criticism
- Independent Study

- Advanced Mechanical Drawing and Design
- Architectural Drawing and Design
- Industrial Design
- Urban Design and Community Planning
- Independent Study

*Titles enclosed in dotted lines are suggestions for locally developed advanced elective courses.

*Minor changes in titles have been made since the publication of STUDIO IN ART—A COMPREHENSIVE FOUNDATION COURSE.

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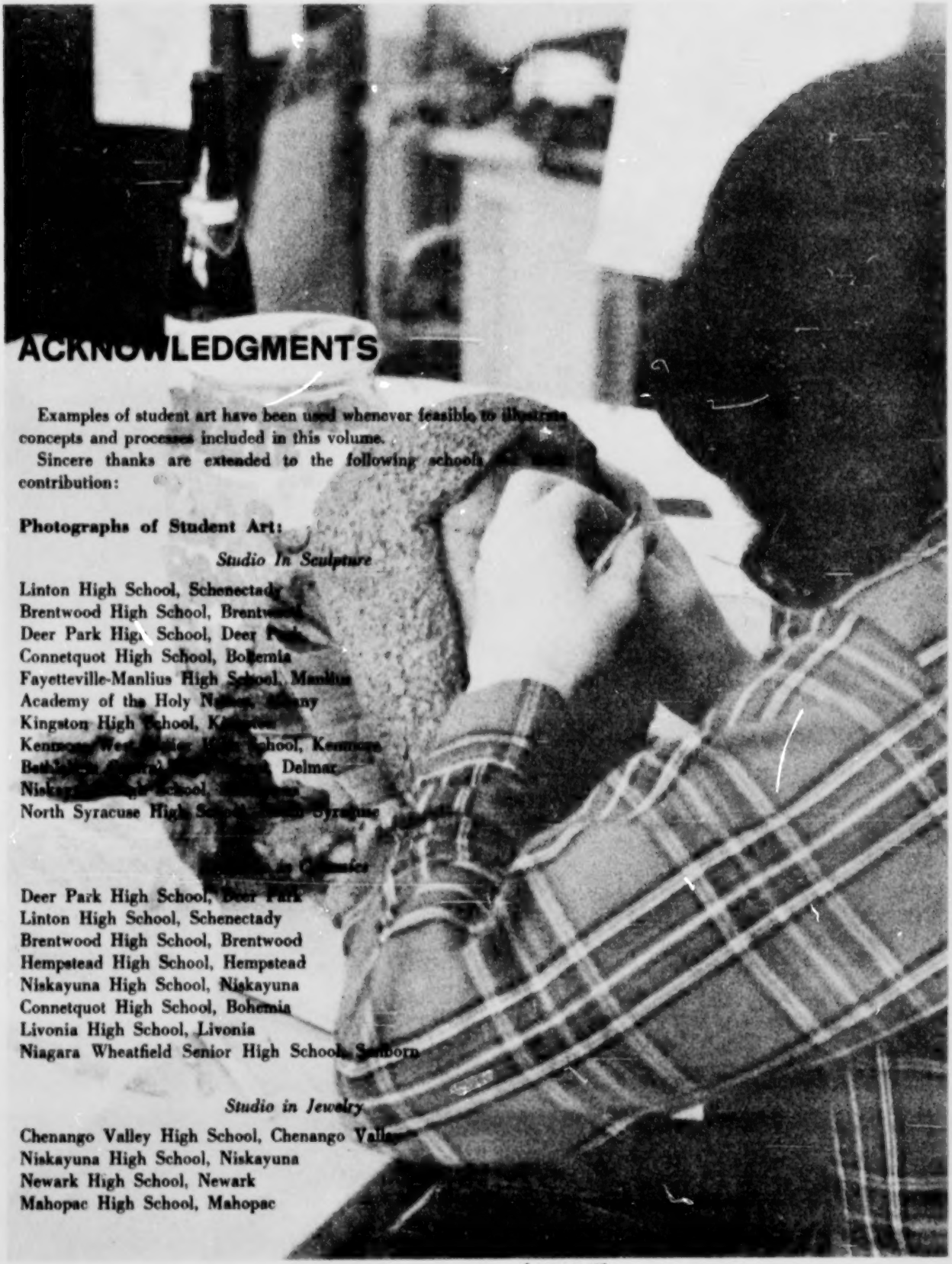

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Examples of student art have been used whenever feasible to illustrate concepts and processes included in this volume.

Sincere thanks are extended to the following schools [illegible] contribution:

Photographs of Student Art:

Studio In Sculpture

Linton High School, Schenectady
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Deer Park High School, Deer Park
Connetquot High School, Bohemia
Fayetteville-Manlius High School, Manlius
Academy of the Holy Names, Albany
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Brentwood High School, Brentwood
Hempstead High School, Hempstead
Niskayuna High School, Niskayuna
Connetquot High School, Bohemia
Livonia High School, Livonia
Niagara Wheatfield Senior High School, Sanborn

Studio in Jewelry

Chenango Valley High School, Chenango Valley
Niskayuna High School, Niskayuna
Newark High School, Newark
Mahopac High School, Mahopac

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STUDIO IN SCULPTURE

COURSE DESCRIPTION

Studio in Sculpture is an advanced course which may be elected after the student has successfully completed a full year of *Studio in Art*. The program offers the student an outlet for self-expression in three-dimensional design in either a particular material or a variety of media. The course is designed to offer both esthetic and technical experiences so that the student will be able to understand and appreciate this art form, acquire dexterity, sensitivity, and mastery of technique to control the media, and learn to express himself in a resistant or plastic material. Since it would be impossible for the student to work in all of the many media contained in this publication, it is suggested that the teacher present several methods and processes in each area. The student would then select the particular methods and processes he wishes to pursue in depth. Student activities are only suggestions of the type of activities which might be included.

Sculpture, with its many media, is especially adaptable to the high school student seeking an opportunity for self-expression in three-dimensional form. Although it offers a variety of plastic, resistant, and structural materials in which the student can explore, it is not always necessary for students to begin with "easier" processes and materials before proceeding to those assumed to be more difficult. A student showing interest and aptitude in a resistant material should be given the opportunity to carve in stone (a "difficult" material) even though he may never have had previous experiences of working in "easier" clay or pliable materials. However, this does not mean to imply that it would be wise to have a student begin with a piece of marble. A piece of limestone would be a more logical choice because it is relatively soft, free of grain, and can be used no matter how old the stone. If the teacher feels that the student is not ready to carve a piece of limestone, however, he might have him start in plaster, kiln brick, or foam glass. But here again, the structural characteristics of each material are different and thus require different thought processes and procedures.

Carving is an entirely different process from modeling, since carving is subtractive while modeling is additive. In carving, one's will must conform to a great extent to both the nature of the material and the action of the tools upon the material, whereas in modeling, a person's will has freer rein. Some students enjoy the challenge of a resistant material, while others feel more confident in commanding a plastic material.

Sculpture, although a highly creative art, demands the development of certain skills. The term "skill" does not imply expertness, but rather a manual dexterity developed by a synthesis of training, knowledge, and experience in the various processes of sculpture. The most significant aspect of skill is its relationship to creative expression.

Students are very conscious of and sensitive to the gap between thought and action, or between concept and expression. They need a certain amount of self-confidence to bridge these gaps, and this can only be gained through an understanding of the sculptural processes and the development of skills. When they realize that they can command media, they will gain the assurance needed to translate thoughts and images into tangible form.

Although sculptural expression stems from intuition, students must understand the construction of expressive order in space and the fundamentals of art structure before they can successfully "conquer" space in three-dimensional form. Therefore, the first unit in the course will deal with both the nature of sculpture and the fundamentals of esthetic expression as applied to sculpture. These fundamentals, which involve the elements of art and the principles of organization, are not considered as ends in themselves, nor will following them guarantee the student good results. However, in understanding their function, the student is guided in finding a visual solution.

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STUDENT OBJECTIVES

This course should provide students with learnings and experiences that will enable them to demonstrate:

- Perceptual and esthetic sensitivity and an appreciation and understanding of three-dimensional form
- Increased knowledge, understanding, and ability to apply various processes and principles to sculpture form
- Ability to work in a variety of sculptural media
- Skills, craftsmanship, and techniques necessary for personal expression in sculptural form
- Respect for the intrinsic qualities of various materials and tools, as well as an understanding of their capabilities and limitations
- Criteria for critical analysis and esthetic judgment of sculptural expression
- An appreciation of our sculptural heritage and its relationship to everyday living
- An awareness of trends in contemporary sculpture

GENERAL DISCUSSION

The opening discussion could be stimulated by questions such as the following:

- What is three-dimensional design? Are all of the following design forms three-dimensional: architecture, furniture, pottery, jewelry, sculpture? What are their similarities and differences?
- What is the fourth dimension in art? How does it relate to graphic art, to sculpture? Give examples of graphic art and sculpture which use the fourth dimension.
- Why are a knowledge and understanding of three-dimensional design important to the layman and to the artist?
- What makes personal involvement in three-dimensional expression so significant?
- How has sculpture served man throughout history? What is the value of sculpture to man?
- Why does man feel such a kinship to sculpture?
- What sculpture forms of significance are located in your community? What particular historical periods do these represent?

Show and discuss a group of slides selected from the visual materials section in the appendix. Include sculpture in the round and in relief, both historic and contemporary, with examples of carving, modeling, casting, and construction.

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Carving

Carving is often referred to as the direct, or subtractive method, since the artist is cutting, hewing, or chipping a stone or block of wood. The Latin word *sculpere* actually means to carve. Historically, this type of sculpture has been associated with mass, weight, definitive form, and solidity.

Sculpture can be created either in relief or in the round. Sculpture in relief projects raised volumes from a background and should be viewed from the front, whereas sculpture in the round projects full volumes into space and can be viewed from all sides.

Carving in Relief

There are two types of relief sculpture: *bas-relief* (low relief), which consists of volumes slightly raised above the background, and *alto* or *haut relief* (high relief), which consists of volumes almost in the round, attached to a fixed background. *Bas-relief* is closely related to perspective drawing in that it gives the illusion of space and depth. Coins, medals, and plaques are typical applications. Bas-relief is also used as incised or raised areas on the surface of sculpture in the round to enhance the total form and emphasize and unify its structure.

Unlike painting, where the painter adds light and tone to create the illusion of depth, sculpture in relief reflects and absorbs light, which emphasizes the actual form and depth of the composition.

Relief sculpture can be created by carving, modeling, or constructing, and in some cases a cast or die may be made of the original sculpture, as in coins, medals, and plaques.

General Discussion

- How does relief sculpture compare to sculpture in the round?
- How and where did the ancient Egyptians use bas-relief?
- Where and in what manner does modern man use relief?
- What hand processes of sculpture can be used in creating reliefs?
- What mechanical processes can be used in creating reliefs?
- Why does sculpture in relief depend on a light source?
- What materials might be successfully used for relief sculpture?
- Could "op art" be considered in the realm of relief?
- What forms of relief have been used to convey information?
  - — haut relief for monuments and tombstones
  - — relief lettering on monuments
  - — bas-relief in narrative art
  - — relief sculpture of the ancient world, the Middle Ages, and the Renaissance
  - — relief sculpture of the modern world, including the wide variety of materials currently used

PLASTER

Demonstration and Discussion

- Assemble such materials as small-toothed scrapers, clay modeling tools, linoleum cutters, leather modeling tools; articles such as spoons, orange sticks, tongue depressors, rasps; and sandpaper, sponges, newspapers, plastic bags, machine oil, and preformed bats of plaster. (Bats should be poured into shallow cardboard boxes or wooden frames and dried, then removed from the containers ahead of time. A hook or wire for hanging then might be added before the plaster firms up.)
- Show how to carve a bas-relief in one of the plaster bats. Draw the idea on paper and transfer it to the plaster by tracing, or draw directly on the plaster. After discussing and deciding which areas are to be carved or scraped away and which are to be left, demonstrate processes of carving, scraping, incising, sanding, and sponging. Students should observe the shadows during the scraping stage and note how the light emphasizes depth and form. Have students practice on the demonstration piece.
- At the close of the demonstration, discuss and show methods of cleaning the tools and work area, emphasizing the need for oiling the metal tools to prevent rusting.

WOOD

Demonstration and Discussion

- Assemble such materials as walnut, maple, cherry, and pine boards; chisels, mallets, stains, oils, sharpening stones, drills, files, nails, screws, wood cement, glue, rags, newspaper, carbon paper, and easel paper.
- Demonstrate carving a wood panel in bas-relief. Show students how to sharpen tools, stressing the importance of having good tools and keeping them sharp. Discuss the idea to be interpreted. This may be organized directly on the wood, with the wood grain becoming a vital part of the visual expression, or it may be worked out on paper and then transferred to the wood surface. Show various wood-carving processes on several different woods, with chisels alone and with chisel and mallet.

- Stress the importance of:
  - cutting with the grain to remove wood and across the grain to establish planes
  - letting the chip of wood rise and loosen after each stroke
  - if the chip is stubborn, removing the tool and cutting from the opposite direction
  - pushing the tool by hand rather than with a mallet in order to maintain greater control
  - always keeping tools sharp, clean, and within reach during carving; sharpening tools often
  - not undercutting the positive areas
  - working gradually and methodically over the entire piece of wood while establishing the various planes
  - causing light and shadow to play a major role in the finished design

CLAY

Demonstration and Discussion

- Assemble carving, texturing, and modeling tools, cloth, and leather-hard slabs of clay (about ¾" to 1" thick).
- Demonstrate how to carve a bas-relief by working with clay in its leather-hard state. Lay a damp piece of cloth over the clay several times during the discussion to retard drying. Using ceramic tools, demonstrate how to carve a relief. Discuss the task of the various tools and show how to smooth surfaces with a damp elephant ear or soft sponge. Encourage students to start with a rough visual idea, letting the nature of the material and the action of the tools assist in the development of the design. When the carving is completed, show how to sponge the relief and place a damp paper towel or cloth over the relief with a plaster bat on the cloth to keep the project from warping.
- Discuss the importance of slow, even drying. After the clay is completely dry it can be fired and then glazed if desired. If a piece is to be hung, holes should be cut through before the clay has hardened. A fired clay plaque may also be glued or cemented to plywood or similar backing material.

Studio Experiences

The student might

- Carve a bas-relief in a dry plaster bat to be stained with neutral watercolor washes. Subject matter might be of a historical nature, based on prehistoric carvings or Egyptian or Greek designs.
- Carve a bas-relief in a selected plank of maple, pine, or cherry. Work out a design which fits the shape and grain of the wood itself. Differentiate various areas through depth and texturing. Oil or wax stains might be added to enhance the final composition.
- Carve a bas-relief sculpture in leather-hard clay using drawings from the sketchbook as resource material. Attempt to stress lines of varying width and depth as detailed texturing. After drying and firing, the design might be stained with a thin solution of turpentine and oil colors. Transparent coats of tempera, buffed with steel wool and coated with lacquer, might also provide an interesting finish.
- Create a relief composition using materials other than those explored in class.

Independent Studio and Research Projects

- Develop a pictorial essay, showing examples of relief sculpture found in the community.
- Do the necessary research and develop a visual report on relief sculpture from a particular period in history, such as Egyptian, Gothic, Medieval, or Renaissance.
- As a group project, develop a series of relief panels with a specific theme.

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Carving in the Round

Essentially, sculpture in the round is free-standing composition designed to be viewed from all sides.

It has been said that direct sculpture in the round is the exposure of forms which exist within the material itself. Although this may sometimes be true, it is an oversimplification. What one sculptor releases from a given block of stone will be quite different from that which another would carve from the same block.

Michelangelo is credited with the statement that it should be possible to roll a stone sculpture down a hill without breaking it. When asked how he would sculpt the figure of an elephant, he replied that he would cut away the part of the stone that did not look like an elephant.

In a sense, the artist is pitted against the stone or block on which he is working. Different materials make different demands on the artist, and since a stone sculpture cannot be dashed off quickly, careful planning is necessary.

The material itself plays a vital role in determining the finished composition. The sculptor must select the medium which seems most appropriate to his idea, and he must also consider the material's basic shape, texture, grain, and size when making his selection.

In general, stone or a stonelike material is especially suited to compact forms, whereas wood can be given freer, more open shapes. However, there is not as much difference between these materials as might be expected. Stone requires less immediate skill but more patience. Wood is faster, but the artist must work under more continual concentration, for if he makes a slip, the composition might have to be altered.

WOOD

Demonstration and Discussion

- Assemble and display a wide variety of tools and media, appropriately labeled and grouped, which would be used in wood sculpture. These should include wood chisels, gouges, rasps, files, sandpaper, steel wool, drill, rifflers, mallets, scrapers, oilstones, and protective glasses.
- Assemble a group of woods available in the immediate area that can be used for sculpture in the round, such as pine, birch, maple, elm, beech, oak, or ash. Also include, if available, any of the more choice woods such as mahogany, hickory, walnut, cherry, apple, pear, and some of the exotic woods such as rosewood, lignum vitae, beefwood, ebony, satinwood, or snakewood.
- Discuss with the class the importance of adequate space, proper lighting, and quality equipment, including a variety of appropriate cutting tools.
- Discuss with the class various ways of acquiring interesting woods in the community. Consider such sources as trees that have been cut down, lumber yards, and industrial operations which use wood.
- Describe the seasoning of wood, and the unique characteristics of each kind of wood available.
- Stress the importance of selecting the block or log which best fits the artist's idea. One should consider not only shape and size, but also the individual attributes of the piece selected.
- Demonstrate several ways in which a carving block can be steadied, and stress the importance of this operation.
- Assemble the various cutting tools to be used. Wearing protective goggles or a plastic work hood, demonstrate on a firmly anchored pine block, the various

types of cuts made by each tool. Show the uses of the other tools as well, and stress safety rules.

- Encourage each student to try the mallet and cutting tools.
- Discuss finishing, which includes grinding the wood with files and sandpaper, then applying a protective coating. Porous, soft, and light-colored woods should be protected with a finish such as wax, oil, lacquer, shellac, or varnish. The finish should enhance the total composition.
- The finish to be used usually depends on the sculpture itself, the mood the artist is attempting to convey, and the characteristics of the wood used. Certain rough woods such as oak are usually more effective when they are allowed to display the marks of the artist's tools. If a wood is rather exotic, smooth, and if the grain is vital to its appearance, a high polish might be given.
- Explain and demonstrate various finishes on appropriate woods. Emphasize the fact that the finish will not cover up poor craftsmanship.
- After the class is acquainted with tools, equipment, various woods, and safety rules, review the importance of the idea itself, as well as the overall design of any sculpture. Stress the importance of selecting the appropriate shape, size, and type of wood.

Studio Experiences

The student might

- Carve a nonobjective sculptured shape which is small enough to fit within the hand. This "handy" or "touch form" might have alternating concave and convex surfaces, or could be drilled through in one or more places. Attempt to have the shape evolve so that the grain becomes an integral part of the design. After the object has assumed its general shape, grind and sand it until it is smooth to the touch, and finish.
- Using a block or log of reasonably soft wood such as pine, create a stylized bird or animal form. Plot the design so that the wood grain will enhance the form.
- After glueing several pieces of choice wood together (such as cherry, walnut, and maple) to form a block, design a sculptured form which will be enhanced by the variety and color of the woods as they appear in successive layers. Saw, grind, and file the woodblock into the final shape.
- Work out several ideas for carving a person's head from a log or block of wood. Make full-size sketches for each view. Attempt to have the shape, facial expression, and the carving technique convey a particular emotion or feeling.
- Select a log which could contain a compact human pose. After working out sketches of a figure crouch-

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ing, sitting, or kneeling, so that all limbs are tight to the body, proceed to carve the finished figure.

- Design and carve a large, nonobjective structure from a log or block of wood. Stress repetition of particular forms in several different ways. The structure might follow forms from nature, such as tree limbs or plant life. Carve or drill through the composition in several different places.

STONE

Assemble and display a variety of properly labeled stonecutting tools such as:

abrasives (gritstone, carborundum slipstones, putty, pumice powders)
bouchard
bullnose
calipers
chisels (lettercutting)
claw
crowbars
drill (electric or hand)
forge
hammers (hardened steel, iron lump)
mallet-headed claws (assorted)
mallet-headed points (assorted)
mallets (wood — beech or lignum vit.)
pitcher
pulley and tackle
punch
respirator
rifflers
rubbing sticks
rubbing bricks
safety glasses
sandbox
stonecutting sand
woodblocks

Demonstration and Discussion

- Familiarize the class with the uses of the different tools which have been assembled. Stress the importance of safety in all operations. All students must wear protective glasses or goggles, as well as a respirator to protect the lungs, when in the area where a student is cutting or grinding.
- Emphasize the fact that the same tools should not be used on marble as on granite. Point out that the granite tools have a blunt point and the marble tools a sharp one; also that tempers are different.
- Discuss the importance of proper forging, shaping, hardening, and tempering of tools. Although sharp, properly tempered tools are important to the sculptor, experimentation, development of skill, and intelligent application are vital.
- Assemble and display a group of stones suitable for carving. Include types that are available locally, as well as several of the more choice types such as alabaster, various marbles, limestone, and granite.
- Encourage students to make a study of stones used by sculptors of the past and present. This study should include architectural sculpture and visiting area museums, art galleries, cemeteries, and monuments in public parks.

- Demonstrate the technique of splitting stone to better fit the composition. Using a properly anchored piece of limestone which has been partially roughed out, demonstrate and discuss this process with the students.
- Emphasize the importance of:
  - never trying to lift a heavy stone (lift in place with pulley and tackle)
  - keeping a firm grip on all tools
  - wearing proper safety gear
  - chipping away at an angle rather than driving directly into the stone
  - using smooth, rhythmic movement of the hammer rather than short hits; chipping gradually in toward the desired form
  - resisting the temptation to develop detail until the larger forms are completely realized
- Discuss the differences in carving marble, limestone, alabaster, and granite.
- Discuss the method of achieving a high polish on marble, working from coarse to fine carborundum.

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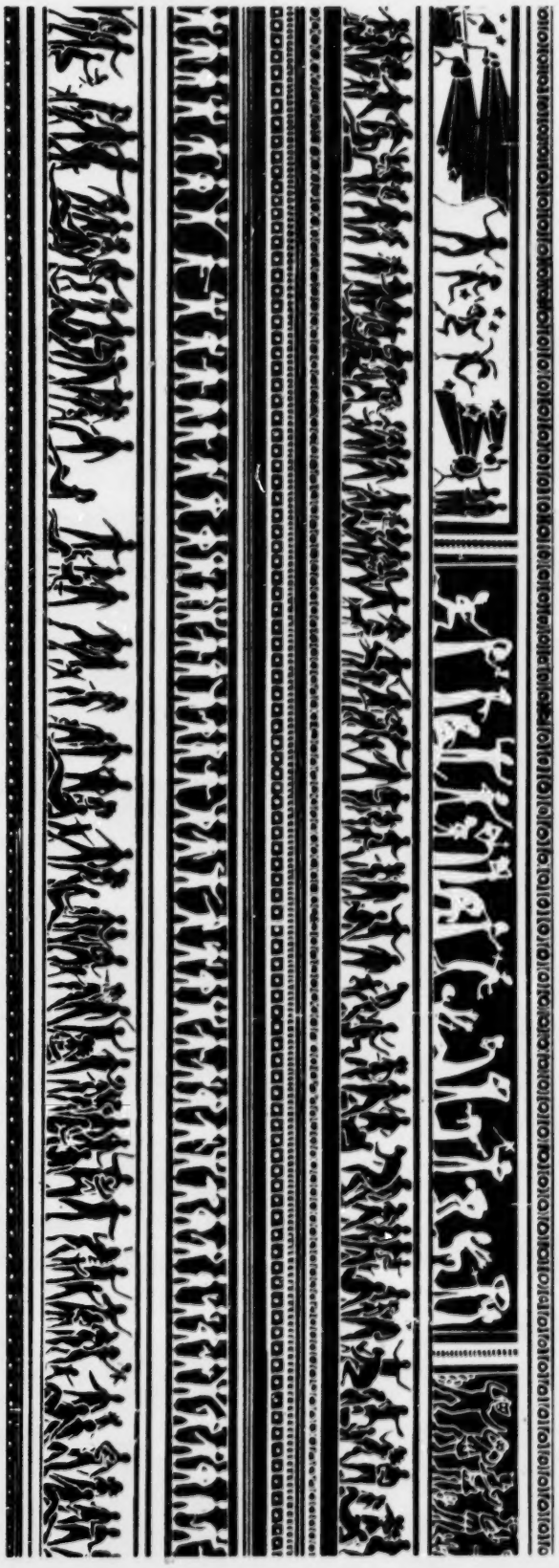

- There are no set methods of carving. Sometimes the stone suggests its own possibilities; drawings of all views are often necessary. A small rough model in clay, plaster, or styrofoam will help.

OTHER MATERIALS

Although stone and wood are the major media for creating direct sculpture, a wide variety of other materials have been used with great success by both sculptors and students. Among these are prepared materials such as blocks of salt, firebrick, soapstone, and petroleum wax.

Other carving media which have proved very satisfactory are those which are formed by mixing various materials and pouring the mixture into a heavy cardboard or wooden box or heavy plastic bag to dry. Materials most often used in these mixtures are various combinations of plaster, vermiculite, sand, cement, and finely crushed or powdered stone, or a prepared mixture. Many of these aggregates containing plaster are ideal for beginning work, for the initial shape may be easily " roughed out " when the plaster is set but not yet hard.

Demonstration and Discussion

- Display several varieties of blocks that have been mixed from the materials mentioned above, as well as prepared blocks other than stone.
- Demonstrate and have the students experiment on several of these blocks. The tools for this type of sculpture are varied and need not be of the finest quality; they may include old wood chisels, hammers, mallets, cold chisels, knives, rasps, etc. Discuss the findings of the group.
- Stress the need for proper safety precautions such as protective glasses.
- Be certain that students understand:
  - the importance of selecting the material best suited for the composition to be carved
  - that the container itself can be preshaped to roughly resemble the design
  - the importance of simplicity in fitting the composition to the block

Studio Experiences

The student might

- Prepare the mixture for a sculpture block and pour into a flexible container such as a large, heavy plastic bag. The form being cast may be altered by leaning heavy objects against the bag throughout the hardening process. After the block is hardened, study the shape, and design an abstract composition that will fit the form.
- After studying examples of African sculpture, design a figure composition that will incorporate some of the characteristics which have been noted.

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- Work out a composition based on the human figure which retains the basic human characteristics. Simplify or rearrange the forms of the body so that they are reduced to basic, essential masses and voids. Refer to sculptures of the human figure by such sculptors as Henry Moore, Alexander Archipenko, Alberto Viani, Jose DeCreeft, Henri Laurens, Barbara Hepworth, and Constantin Brancusi before completing the sketches.
- Work out several sketches for a sculpture of an animal form, and develop a model in styrofoam. After consulting with the teacher, proceed to carve the sculpture in a material of his choice.
- Select a log or block of wood from which to carve a human head. Design the sculpture so that the grain becomes an integral part of the design, and so that as little wood is carved away as possible.

Independent Studio and Research Projects

- After doing the necessary research, write a paper comparing the sculpture of two such diverse artists as Donatello and Brancusi. If possible, include pictorial material to illustrate the text.
- Design a group figure sculpture expressing individual feeling about a particular social, political, or religious question.
- Design a sculpture based on an animal form, a bird form, or the human figure, in which either the general characteristics or specific parts are greatly exaggerated. Refer to works of Gaston Lachaise, Amadeo Modigliani, Wilhelm Lehmbruck, Henri Matisse, Henry Moore, and also to examples of African sculpture.
- Prepare a report on the influence of African sculpture on the art of the twentieth century.

Modeling

Relief Modeling

MOIST CLAY

Demonstration and Discussion

- Assemble red clay, boxwood tools, elephant ear sponges, cheesecloth, oil cloth, throwing board or a slab of plaster, shallow box, wire, knives, modeling tools, and clay engobes.
- Demonstrate how to model a high relief using clay. Spread a piece of canvas or oilcloth on the table with the rough side up. Show how the background can be formed by pressing wedged clay into a shallow plastic container or a cardboard box lined with plastic, or merely rolled out and cut to the desired shape. Show how the design may be added to the background by using small pieces of clay while gradually building up the relief. Various objects might be pressed in for texture, and details added with modeling tools. For hanging purposes, holes can be pressed through the design. Subtle color may be added to the moist clay through the use of engobes. To prevent warping, the relief must be allowed to dry slowly and evenly. If glazing is desired, it may be added to the entire piece or to selected areas after the piece has been properly dried and fired.

SURGEONS' GAUZE

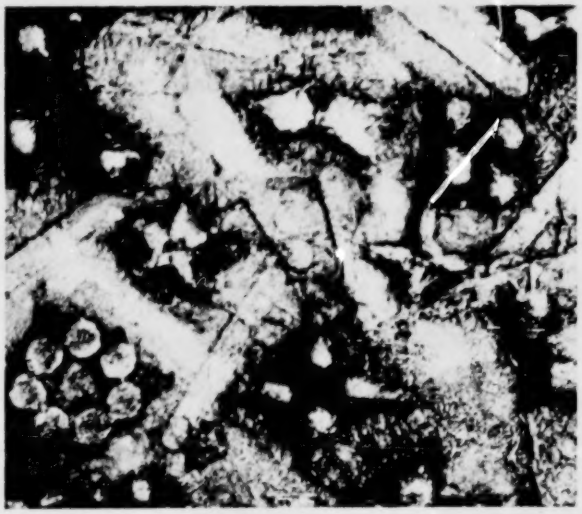
Demonstration and Discussion

- Assemble such materials as bowls of water, shallow box lids, newspapers, paper towels and napkins, old sheeting, scissors, cardboard, gold spray enamel, pariscraft or surgeons' gauze, modeling tools, and epoxy glue.
- Show how to model pariscraft (surgeons' gauze) into a high or low relief. Spread newspapers over the table and dip pieces of gauze in water. Remove them and show how to model pieces within or on the back of a shallow box or lid. Pulp for modeling can be made by dipping pieces of paper toweling, napkins, plates, or old sheeting in water. Squeeze to remove excess water, and place under the wet pariscraft to enlarge the form or volume. Strips will bind the supplementary material and provide a smooth surface. A finish might be added by using various stains and patinas.

COPPER FOIL REPOUSSÉ

Demonstration and Discussion

Assemble such materials as 36-gauge foil (copper, brass, or aluminum), pads of newspaper or pieces of foam rubber, liver of sulfur, shallow glass or plastic containers, medium and fine steel wool, modeling tools, orange sticks,



lollypop sticks, ends of old penholders and brushes, masking tape, and clear plastic spray.

- Demonstrate how to make a bas-relief using copper foil. Place a scrap piece of foil on a pad of newspapers or piece of foam rubber. Demonstrate the tooling process by making convex and concave curves, discussing the importance of hand pressure and the direction of each stroke. Show how different tools will perform different tasks and produce different effects such as texture, pattern, shape, volume, and lines. Discuss the means of exaggerating form to give the illusion of depth by tooling objects in the foreground in higher relief than those in the background, and stress the need to establish two or three definite planes. When the design is completed, demonstrate oxidizing the piece by dipping it in a solution of liver of sulfur, then polishing the raised surface with steel wool. Discuss the importance of spraying the completed piece with clear plastic to prevent further oxidation.
- Discuss how a relief mural might be made in copper foil as a class project.

Studio Experiences

The student might

- Select subject matter from the sketchbook and model it in relief on copper, bronze, or aluminum foil.

- Develop a relief plaque in moist clay. Stress the additive technique, using many small pieces of various colored clays and building up the design with a variety of interesting textures.
- Design and construct a mask using plaster and cloth.
- Develop a relief sculpture using suitable media not explored in class.
- Design and construct a school plaque or seal in low relief, from which a mold and castings can be made.
- Select a theme for a class mural project. Each student might produce one part of the theme on his piece of copper. Discuss the desirability of conforming to one style of expression for the sake of unity. Have students antique pieces with liver of sulfur. When the students have completed their tooling, show how pieces may be arranged on a large piece of plywood. Use pushpins as a temporary means to hold the copper in place and a power stapler for permanent tacking. After the pieces have been organized and stapled to the plywood, show how to nail wood stripping to frame each piece and to frame the entire mural. The frames can be painted, if desired. Brass and aluminum can be used in place of, or intermixed with, copper shapes.

Modeling in the Round

CLAY

Clay is an ideal medium for modeling in the round, for it is immediately responsive to the hand and tools, and may be worked and reworked until the desired shape is achieved. Clay is also one of the few modeling media which can also be the final product. If the artist has designed the piece to his satisfaction and if he requires no copies of his work, he can fire his composition as discussed in *Studio in Ceramics*.

Demonstration and Discussion

SOLID FORM

- Using a solid block of wedged moist sculpture clay and an armature, show how to begin a portrait head. Emphasize that this solid form built upon an armature (to be hollowed out later) is perhaps the easiest method.
- After a rough basic head is shaped (this may be done ahead of time by the teacher), have a student assume a pose so that features may be gradually developed.
- Emphasize the importance of:
  - the fact that clay sculpture is the finished piece
  - anchoring the clay firmly to the armature ("butterflies" or wood blocks on wire will help prevent slippage)
  - keeping work in a plastic bag when it is not being worked on

- relating the main structural masses while emphasizing the essential planes of the face
- studying the profile or silhouette
- careful handling and support while the top of the head is being cut off and hollowed out
- coating both surfaces with thick slip for joining
- leaving a wall thickness of approximately ¾" for a full-size head
- allowing the completed head to dry very slowly and uniformly so that cracks will not develop

Hollow-built clay sculpture

- Using a variety of tools suitable for this method, demonstrate the rolling out of a large slab of sculpture clay (terra cotta plus grog) of uniform thickness. This can be done easily with a rolling pin on a piece of canvas or oilcloth to keep clay from sticking to the table. (This process is described in *Studio in Ceramics.*)
- Show how this slab of clay may be cut with a knife into long, flat strips of the same thickness or into larger predetermined shapes. Demonstrate how a simple figure, head, or nonobjective sculpture may be built up by adding flat strips or coils.
- Using the larger slab pieces, show how a sculpture may also be built by joining the slabs together.
- Illustrate how these slabs can be formed into tubes by using a section of pipe, a dowel, or a heavy cardboard tube for shape and support.
- Emphasize the following points:
  - Sections can be more easily joined together if the edge of the clay slab has been beveled.
  - A simple wall may be built within a torso or large hollow sculpture to give support.
  - It is important to use slabs of equal consistency (i.e., containing the same amount of water).
  - Even the most naturalistic piece may be started by the hollow ceramic method and then built upon.
  - Projecting parts must often be supported with tubes or balls of clay during the building and drying period. (These will shrink as the sculpture shrinks during drying.)
  - One of the most troublesome aspects of hollow ceramic sculpture is often during the drying period. The smaller or thinner parts must often be wrapped in damp towels or plastic so that they will dry at the same rate as the rest of the sculpture.
  - The groggy surface is one of the prime attractions of ceramic sculpture and can be enhanced by further scraping and texturing.
  - All parts or limbs should be kept as part of the basic shape rather than projecting into space.
  - The finished sculpture must be completely dry before firing.

Providing a base for the sculpture

- Show examples of sculptures of the type that are (1) self-supporting, (2) mounted on a base.
- Discuss with the class the various ways in which a finished sculpture may be presented or displayed, so that each student will either plan the base as part of the sculpture itself, or mount it after the finished sculpture is fired.
- Demonstrate various methods of adding bases such as wood, plaster, or cast stone.

Firing

- Discuss with the class the complete bisque-firing process, including the chemical change that takes place, completely altering the properties of the clay. (Firing is discussed in detail in *Studio in Ceramics.*)
- Be sure that students understand:
  - why each piece must be completely dry before firing (this may take several days or weeks, depending on the size and thickness of the piece)
  - the method of stacking the kiln
  - the importance of the slow firing period, and cracking the kiln to allow water to be driven off in the form of steam
  - why it is not safe to bisque-fire and glaze-fire in one operation
  - the cooling period, the cracking of the kiln, and the removal of pieces

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PLASTELINE

Plasteline is a good material for the student to use when building his first sculpture study. It must never be fired. After the material has been kneaded, a small figure can be constructed by adding bit by bit. Since this material is made of clay and oil, it has the property of remaining soft and may be reworked and reused many times.

Demonstration and Discussion

- While preparing to demonstrate the creation of a simple form, figure, or head of plasteline, have each class member work and knead a ball of this material.
- Discuss the general characteristics of this medium and its normal uses to the sculptor.
- After demonstrating the technique of building a figure out of solid plasteline, show the class how this material can also be used over a wire armature to create a larger or more complex sculpture.
- Emphasize the following points:
  - Plasteline is generally used for preliminary studies or to make a completed work from which a mold and casting will be made.
  - Sketching the composition might be of great help before actually beginning with the plasteline.
  - Plasteline offers complete freedom, since it may be altered or reworked at will.
  - This medium, when used with an armature, permits construction of compositions and figures that might be totally impossible in carving.

PLASTER AND CLOTH

A tiny figure or a composition larger than life may be modeled with plaster and cloth. Any porous type of fabric such as burlap, muslin, or cheesecloth dipped in liquid plaster provides a suitable modeling medium. Commercially prepared gauze impregnated with plaster (such as pariscraft) may also be dipped in water and used with ease and satisfaction.

Demonstration and Discussion

- Using a previously constructed sturdy armature of wire and screening mounted on a wooden base, demonstrate the building up of the composition with the cloth and plaster strips. Discuss and show how even fine features may be incorporated by adding pure plaster with a spatula or knife. Describe how details may be further emphasized when the structure is dry by filing, carving, and sanding.
- Be sure that students understand:
  - the importance of having a rigid armature
  - the importance of adding the strips from the bottom up so that the foundation will support the composition
  - that several layers are needed to assure rigidity of the completed form
  - the many ways in which the completed composition may be finished, such as adding sand for texture, or carving, or coloring with various patinas
  - the fact that an area may be reinforced or repaired, even where dry, by wetting that area before adding more plaster and cloth.

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PLASTIC METAL

Before the production of metal in a plastic base, the sculptor had to be content with such media as cast metal, wrought metal, and soldered or welded metal. Since the advent of "plastic metals" such as auto body solder, plastic aluminum, "Sculp Metal," or "Metal Modeline," the sculptor has been able to model with metal.

Demonstration and Discussion

- Over a preformed armature of wire, or wire plus metal screening attached to a base, show the class how to build up the sculpture with relatively thin coats of plastic metal. Discuss the importance of drying time between coats (about 1 hour), so that each is set before the next is added. Mention the cost of the medium and the importance of filling in masses with screen or wire so that the plastic metal will be more a finish coat than a solid structure.
- Show how the metal may be thinned with the appropriate solvent so that detail may be achieved. (The room should be well ventilated when this medium is being used.)
- On another partly completed, dry sculpture, show various ways of treating the surface, such as:
  - burnishing with a metal spoon
  - sanding with a small power tool
  - using a thin metal solution as a slip
  - brushing on and rubbing off various stains or patinas for color
- Mention that further individual experiments with liquid or cold solder may be attempted by using it as a finish coating over small wax, wire, or plasteline figures, or as a simple casting material.

ACRYLIC POLYMER RESINS

The acrylic polymer resins provide a complete range of media. These materials are not only highly satisfactory for painting, collage, and relief constructions, but also offer great possibilities to the inventive sculptor as modeling media.

This highly durable plastic resin, which is suspended in water as fine particles, dries to an insoluble film as fast as the water evaporates. Not only is it ideal as an adhesive, but it is also excellent as a modeling paste. In this form it is an acrylic putty, pigmented with finely ground marble.

In creating a structure or figure with an armature of such materials as wood, wire, or heavy cardboard, the modeling paste may be gradually built up in successive coats with a brush or spatula, allowing sufficient time for drying between coats. Since part of the volume is lost as the water evaporates, shrinkage cracks may appear, but these may be easily filled with more modeling paste.

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The student may continue to build the composition up until the general desired shape is attained. This may then be carved, sanded, filed, or tooled. Large masses will be even stronger if a polymer gel medium is mixed with the modeling paste.

The surface of the completed composition may also be textured by adding strokes or stipples with the polymer medium or by adding more modeling paste. Color may be added from the wide range of compatible polymer paints.

Polymer resins have been extremely popular in contemporary "op" and "pop" sculpture because of the subtle translucent and transparent qualities which can be achieved.

Studio Experiences

The student might

- Design and construct a large hollow-built composition in clay which will stress positive and negative curved forms seen in nature.
- Using a wire armature and base, build a figure study from a posed student model.
- Work out an action composition of a group of interrelated figures such as dancers or acrobats, to be modeled in plastic metal or plaster and cloth.

- Construct a composition in which animal, bird, or fish forms are used as a point of departure.
- Design a large hollow-built clay head or figure composition.
- Develop a self-portrait study in any modeling medium.
- Construct a nonobjective sculpture by using found objects combined with polymer modeling paste. Attempt to have the modeling dominate the composition.

Independent Studio and Research Projects

- Design and build a large garden sculpture in clay. Glaze selected areas of the completed structure.
- Develop a large sculpture by adding to and subtracting from a simple geometric solid of wedged clay.
- Design a sculpture that will emphasize both form in space and surface decoration.
- Develop a visual presentation comparing the works of two diverse sculptors such as Barlach and Giacometti.
- After completing the necessary research, write a paper on the historical aspect of sculpture, such as the large, hollow-built Chinese animal sculptures.

Casting

Casting, in its various forms, has been used for thousands of years in most parts of the world. It should be remembered, however, that merely knowing how to cast does not make one an artist. The composition itself, designed specifically to be cast, is most important. Simple relief molds are easily reusable so that many casts may be made. In order to cast a complex design in the round, a waste mold is usually employed. As the name suggests, the waste mold is destroyed as it is broken away from the cast sculpture.

Casting in Relief

SAND CASTING

Demonstration

- Assemble a plastic dishpan, damp sand, ceramic tools, towels, blocks, spools, tongue depressors, sticks, tablespoon, molding plaster, plastic pail, soap paste, newspapers, and water.
- Demonstrate how to make a relief in plaster using the sand casting method. This sculptural form is made by pouring plaster or metal into a sand mold. Although this process is relatively simple, organizing the design is a real challenge, for it requires the student to visualize a positive image while working in

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negative relief. Show how to press forms in the damp sand, and use various modeling tools to imprint or hollow out the areas.

- Mix and slowly pour a relatively thin solution of plaster into the design, being careful not to disturb the sand mold. When the plaster is ready to set (warm), imbed a hook made from a coat hanger into the plaster for wall hanging. Wait until the cast has thoroughly set, remove from the container, and brush off the excess sand.

PLASTER OF PARIS WITH CLAY

Demonstration

- Using either plasteline, moist clay, or any other pliable modeling material, design and make a simple sculpture to be reproduced from a one-piece plaster of paris press mold. The subject matter might be anything from a plaque to the front view of a human face to a standing, nonobjective design.
- Lay the object right side up in a heavy cardboard or wooden frame that is both higher and wider than the object. Mix a batch of plaster of paris in a plastic or rubber bowl until it reaches the consistency of whipped cream, then pour it into the box containing the work.
- After the plaster is completely set and hard, the container may be inverted and the original piece removed. When the plaster mold has been thoroughly dried (several days), it should be scrubbed with liquid soap and a toothbrush to remove all traces of the original sculpture. If plasteline was used, the oily film must be completely washed out.
- Emphasize the importance of:
  - designing the object so that it can be cast
  - not undercutting the design
  - using the proper method of mixing plaster of paris
  - tapping the container after the plaster is poured so that air bubbles will rise to the surface
  - not removing the container until the plaster is completely hard
  - thoroughly cleaning the mold

CASTING THE PRESS MOLD

Demonstration

- Show the class the following methods of casting clay from the dry plaster of paris mold:
  - rolling a large slab, cutting desired shape, draping and carefully pressing it into the mold with fingers or an elephant ear sponge, and trimming away excess clay
  - creating the cast piece by systematically pressing many small pieces of clay into the mold so that a wall of equal thickness is built
  - pouring in liquid clay (slip), allowing time for water to be absorbed into the mold, then pouring off when the desired thickness has been achieved (about $\frac{1}{4}$" to $\frac{1}{2}$").
- Emphasize the importance of:
  - achieving a uniform thickness of clay (the thickness depends on the size of the object to be cast)
  - being certain that the clay is pressed well into all parts of the mold, if moist clay is used

— tapping the mold so that any air bubbles in the slip will rise to the surface, if liquid clay is used
— refilling the mold if the slip sinks to too low a level
— not pouring off slip until desired thickness has been achieved
— removing the cast only when clay has become very firm (almost leather-hard)

Studio Experiences

The student might

- Select a group of objects to press into a container of moist sand in order to develop a high relief design for casting in plaster.
- Cast one of the pieces constructed during the class unit on modeling in clay.
- Design and cast a relief composition of a group of figures in action, in which the background is a planned part of the total design.

Independent Studio and Research Projects

- After studying the sculpture of other civilizations, the student might design and cast in clay a mask based on a particular style or form which interests him.

Casting in the Round

WASTE MOLD PROCESS

Demonstration and Discussion

- Using a simple clay head or figure composition built over an armature in moist clay or plasteline, have the class members examine the piece and decide at which points a mold would be separated into sections. Discuss the fact that each piece of sculpture presents special problems. Have the class study the protruding forms and deep cuts so that the divisions of the cast will not be impeded when each section is dry and lifted from the original.
- After the class and the teacher have agreed upon the divisions to be made, insert a band of brass shims into the surface of the piece. These shims should be about 1" long so that they may be inserted about $\frac{1}{8}$" into the clay, allowing for a plaster cover about $\frac{3}{4}$" to $\frac{7}{8}$" thick.
- Using a large plastic or rubber basin half filled with water tinted deeply with bluing, sift in plaster of paris slowly while a class member stirs the mixture. When a whipped cream consistency has been attained, it is ready for the first blue coat.
- Using the fingers as a scoop, lightly throw the mixture onto the original model, working from the top down, completely covering it about $\frac{1}{4}$" thick with the mixture. (Throwing eliminates air bubbles.)
- After this has set, mix another batch without bluing and repeat the same process. Apply a thick, even coat over the entire mold until all but the top of the shims are covered.
- When this final coat has set to full hardness, the sections may be carefully pried apart at the shims. This can be done by thoroughly wetting the joints, cutting a few wedged-shaped incisions, and lifting the shims out one at a time. The mold should be carefully pried apart a little at a time at various points, because forcing may break the mold. The parts of the mold may then be lifted off after the pieces have separated completely.
- The mold may now be cleaned of all of the original clay and washed. After this is completed, several coats of liquid soap should be painted on the interior of the mold and allowed to dry. When dry, a film of oil should be applied to completely coat the interior.
- When the cast parts are ready for reassembling, fit the sections together so that they register perfectly. The joints should then be sealed with burlap strips soaked in fresh plaster, or with several layers of pariscraft. After these strips are dry, the mold will hold tightly together and be ready for casting.
- Another batch of plaster should now be mixed to fill the interior of the mold. Pour the plaster solution into the mold and swish it into all parts of the interior. Pour the plaster in a slow, steady stream to avoid air pockets. The mixture should then be poured back into the bowl, leaving a thick coat of plaster on the interior. This should be repeated again and again, allowing the plaster to set between coats.
- Strips of burlap should be added to further strengthen the plaster. When a thick wall has been built, a strong, hollow casting of the original will have been made.
- After this is dry and completely hardened, the mold may be carefully chipped away to release a replica of the original design. This delicate procedure is done with a chisel and a mallet while the mold is inverted on a cushioned surface, such as a box filled with wood chips or sand. Chipping may be done rather freely until the blue coat is uncovered; this indicates that the chisel is approaching the cast itself. The remaining coat should be chipped away delicately until the finished coat is revealed.

Note: If the opening in the base is large enough, a simpler cast may be made by using the press mold or liquid clay method described above. In these cases the oil and soap coatings should be eliminated and the plaster allowed to dry for several days. By reproducing the original in clay in this manner, the mold need not be destroyed, but may be carefully pried and lifted off when the clay has become firm.

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- The process of creating a cast from a waste mold may also be used for a cast stone sculpture. This is a dry mixture of stone particles and powdered stone plus water to which coloring material has been added (also called cement fondu). This extremely durable material may be chiseled and filed when completed, and is ideal for garden sculpture pieces.
- Castings of plaster of paris, concrete, or wax can also be taken from a clay mold. In this way the artist might choose to make plaster castings from clay molds of organic forms such as stones or bones, or from found man-made objects.

ADDITIONAL CASTING METHODS

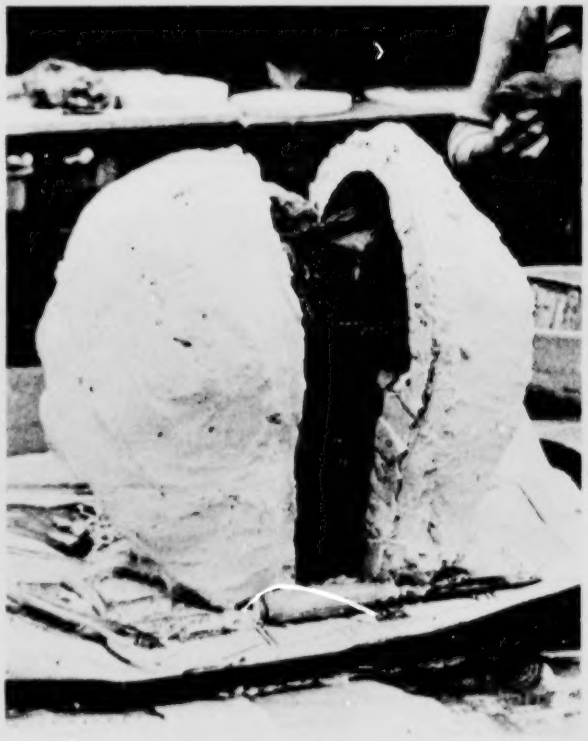
There are many age-old and new techniques for casting and moldmaking that might also be pursued. The teacher should be cautioned, however, not to attempt these methods unless:

— he is completely familiar with the entire process
— essential facilities, equipment, and materials are available
— proper safety rules are understood and followed
— the student has demonstrated his ability and interest in pursuing further study in sculpture
— the student has completed thorough research of the process to be undertaken

The teacher may wish to introduce one or more of the following processes which might be pursued through independent study:

polyester resin
polyvinyl chloride and gelatine
cold-curing rubber compounds
expanded polystyrene

metal processes:
- lead
- alloys
- lost wax
- lost pattern process (foamed polymer)
- sand molding
- predetermined core



Studio Experiences

The student might

- Design and build a self-portrait head in clay or plasteline to be cast in clay from a plaster mold.
- Create a plaster deep-relief sculpture using the sand casting process.
- Construct a seated human figure in clay to be cast in plaster from a waste mold. Attempt to simplify the basic forms of the figure rather than doing a naturalistic study.
- Develop a nonobjective composition based on geometric forms, which will then be cast from a plaster mold.

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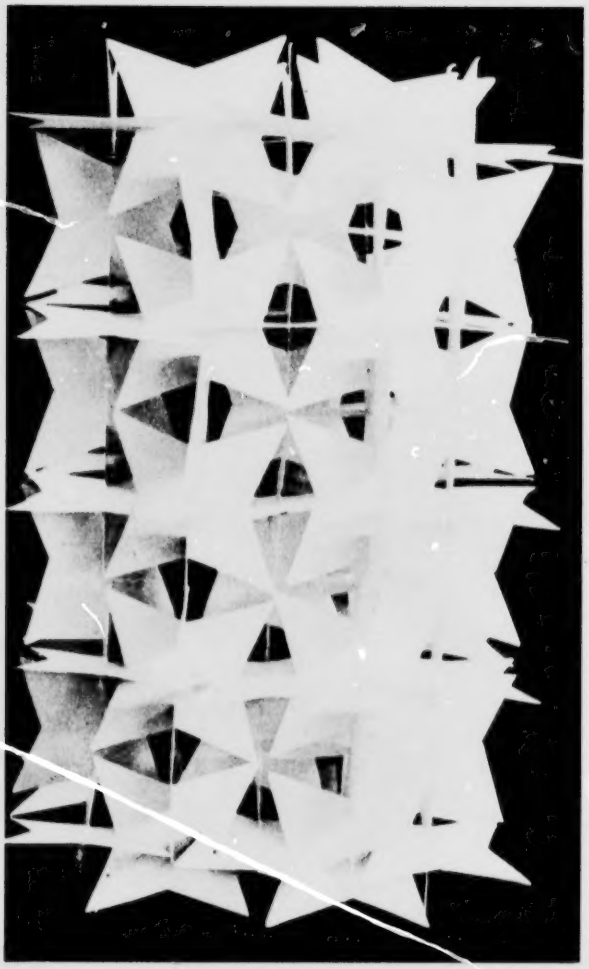

Independent Studio and Research Projects

- Design a sculpture to be cast in plaster or cast stone from a waste mold, which will emphasize the distortion of the human figure.
- After preliminary research, design relief heads and figures derived from African tribal sculpture forms. These could be modeled in clay, then fired and used as part of a class mural.
- Study the works of several sculptors such as Henry Moore, Gaston Lachaise, and Leonard Baskin, and attempt to determine how their pieces were cast and in what material.
- Design an abstract composition made of several modules that could be cast separately in clay, kept moist, and joined later.
- Several of the student activities suggested for modeling could be developed with the intent of casting the pieces later.

Constructions

The process of constructing sculpture is primarily an additive one. It is akin to modeling, in that the sculptural form is built up. The art of assembled sculpture is a 20th century innovation and has been inspired by interest in space, automation, technology, and by the availability of new materials. Constructions lend greater freedom of exploration and experimentation with a variety of materials than either carving or modeling.

Constructions are three-dimensional visual expressions, and can take the form of a stabile relief construction or a mobile. Constructions may also be four-dimensional expressions called mobiles, which involve motion in time and space. Time-space effects can be achieved either by manual, mechanical, magnetic, or atmospheric means. Calder's mobiles require manual or atmospheric force to set them in motion. Schaffer's kinetic constructions require mechanical means to put them into motion, and in order to coordinate and organize the various motions, his constructions are programed by a computer.

In "op art" sculpture, optical illusions give a semblance of movement. The illusion of movement in "op" sculpture is created not only by optical illusion, but also by the movement of the observer. In order to receive the full visual message, the observer often must walk around the sculpture, back and forth before it, or tilt his head at various angles. Thus he views it in a sequence of time.

Relief Constructions

The first several activities to be explored are designated as constructions in relief, but with minor changes would be equally suitable for constructions in the round, since all of the materials and techniques used in assembled sculpture may be employed equally well in either type of sculpture.

CARDBOARD

Demonstration

- Assemble various materials such as cardboard, wood scraps, an assortment of shallow cardboard boxes, textured wallpaper, colored corrugated board, cork, contact paper, wood chips, insulation board, casein glue or rubber cement, newspapers, saw, and mat knife.
- Show how to make a relief construction by using geometric shapes of cardboard. Cut a variety of geometric shapes out of scrap pieces of pebble board. With an artificial light source from one direction, organize shapes on a white board of the same material. Build up the relief by adding shape over shape.

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or stagger them so that sections of the shape underneath remain visible. The major problem is to arrange the planes so that they exaggerate the normal shadows and reflections of light. Students may wish to glue or cement shapes as they organize the relief, or to cement the entire composition when completed.

- Show various ways of constructing a relief mural using small, shallow boxes of all sizes and shapes. Small boxes can be glued inside larger boxes, and any boxes with covers of interesting design and texture may be used. The shadows cast by the boxes add both unity and variety. An interesting play of shadows can be created by connecting string to the edges of the boxes, thus tying the design together. Color may be added to the composition when completed.

WOOD

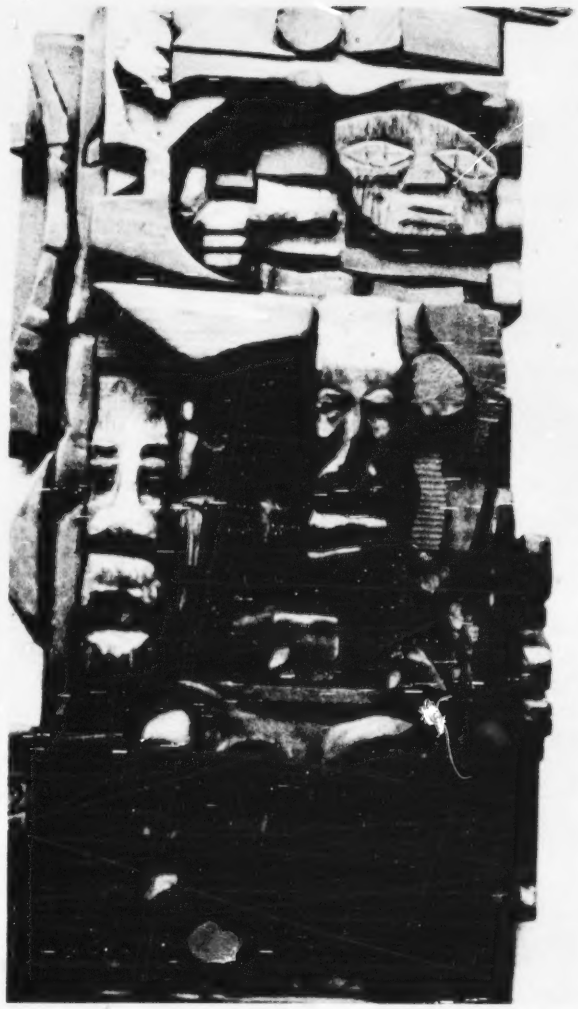
Demonstration

- Assemble such materials as wood scraps, bark, chips, shavings, sawdust, driftwood, reed, balsa strips, toy scraps, spools, tongue depressors, small wood scraps, large piece of celotex, chipboard, plywood, or building board, wood adhesive, oil stains, and wax stains.
- Demonstrate the technical processes of cutting, chiseling, chipping, gouging, sawing, drilling, joining, and finishing wood. Show how a cut across the grain differs from a cut with the grain. Apply oils or stains to show how the grain can be emphasized, and how these can affect wood color. After several pieces have been textured, drilled, sanded, and stained, assemble them on masonite, plywood, celotex, chipboard, or building board. Show the various possibilities for arranging the pieces on the background. Stress fitting pieces of curved reed into the negative areas for rhythm and variety, and creating interesting textures by covering areas with glue and sprinkling sawdust or wood shavings onto them.

METAL

Demonstration

- Assemble various sized pieces of copper sheets, small copper scraps, a variety of copper wires, soft solder, flux, propane torch, liver of sulfur, a pan of water, steel wool, copper cleaner, tongs, tweezers, and small tinsnips. Use asbestos board to protect the work surface.
- Demonstrate the simple soft-soldering technique with copper pieces and wire. Stress the importance of thoroughly cleaning each piece where it is to be joined. Show how the drips and puddles of solder might also be incorporated into the design. Show the process of cleaning after soldering, as well as antiquing through use of a solution of liver of sulfur.



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- The student may find copper and brass constructions more difficult to create and assemble; however, the very resistant nature of the material as it builds up may be a challenge to some students. Like aluminum construction, copper and brass sculpture must be carefully planned.
- Demonstrate the methods of tapping, chasing, and planishing the metal, and show how to form it on a piece of foam rubber or a sandbag into both convex and concave curves. Using this piece and other demonstration pieces, show the various possibilities for assembling the materials.
- Metal and wire can be combined with other materials. Demonstrate the possibilities of adding pariscraft or burlap, mesh string, or metal screening dipped in plaster and fastened to the construction.
- Be sure that students understand:
  - the importance of strictly following the safety rules
  - the reason for using copper or lead wire, since solder will not adhere to steel or aluminum
  - the reasons why an armature must be well constructed
  - the wide variety of subject matter which may be attempted in this medium
  - that most metals become hard, stubborn, and brittle after too much pounding

Constructions in the Round

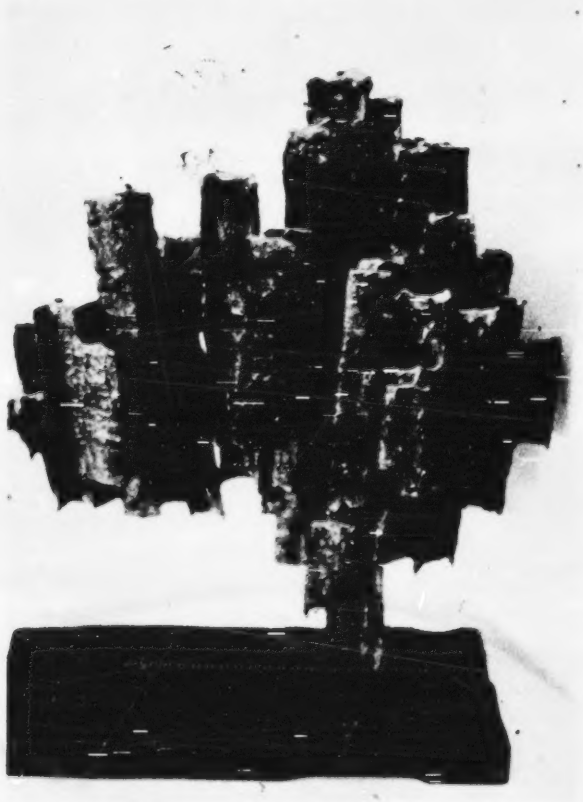
CLAY

Constructing in clay generally involves joining. The individual units themselves may be formed by: the slab method; by wheel throwing; by molding with a sand or handmade plaster hump mold, found object mold, sling mold, or paper core; by the pinch-pot method; or by coil building. These approaches are discussed in *Studio in Ceramics.*

Demonstration

If class members are not familiar with clay as an art medium, the teacher should briefly demonstrate and discuss the characteristics of clay and the various processes necessary to take the clay from wedging through firing. Students should be encouraged to choose one of the simpler methods of construction if working with clay is a new experience to them.

- Display a variety of previously formed shapes of moist clay, and include whatever materials were used to achieve these shapes.
- Demonstrate how precut, leather-hard pieces of clay may be joined by dipping or painting both surfaces with slip and then pressing firmly into place.



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- Demonstrate how to join two pieces of moist clay securely together by scoring both surfaces with a tool, moistening with a wet sponge, and pressing the parts firmly together. Show how to further strengthen the joint by working this area with a tool while pressing small bits of moist clay from adjacent areas into this joint.

- Emphasize the following points:
  - design is of prime importance in any sculpture medium
  - it is important that all clay to be joined be of the same consistency
  - the larger the structure, the thicker each piece must be. It is suggested that ¾" be the maximum thickness
  - short drying periods are usually desirable between each addition so that the clay will firm up
  - clay projects in progress should be stored on a firm, nonporous surface and placed in an airtight plastic bag or damp cabinet
  - completed projects should be exposed to the air gradually so that the drying process will be slow and even
  - constructions should be fired only when the project is completely dry
  - the slower the firing, the less chance for explosion

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PLASTIC

Plastic can be constructed and modeled with the same tools that are used for wood and metal: handsaw, jigsaw, drill press, and files. There are many kinds of plastics on the market, but probably those most adaptable to sculpture are sold under the trade names of Acryloid, Crystalite, Lucite, or Plexiglass.

Demonstration

Plastic is hard and brittle, but when heated it becomes soft and pliable. Demonstrate how plastic can be successfully softened by submerging it in hot salt. Salt is used in preference to water because it can reach and maintain a temperature of 222°F to 300°F by using an electric appliance such as a deep fryer, frying pan, or coffeemaker. Salt will not discolor the plastic, it can be washed off easily, and it is safer to use.

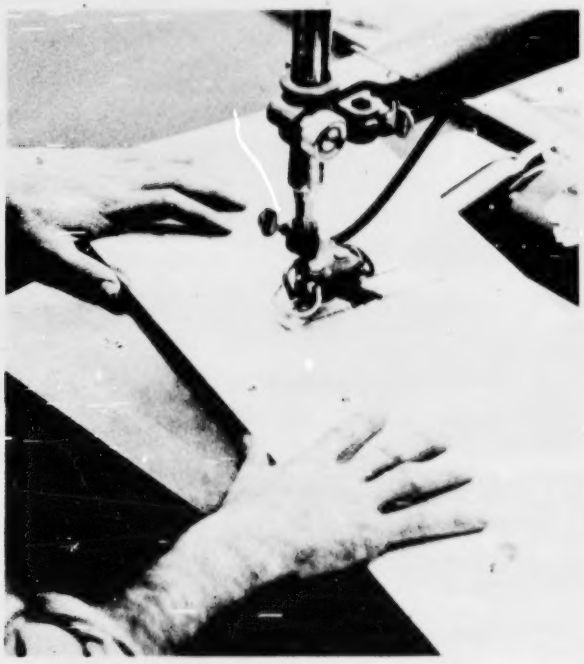
- Caution the students not to change the heat control unit once it is set at the correct temperature. If the salt becomes too hot, it will stick to the plastic and make pit marks on the surface.
- Experiment with various kinds of plastic. Some must be left in the hot salt longer than others. Experimentation can provide information as to the time needed until the plastic is soft and flexible enough for shaping. Care must be taken when removing the hot plastic from the salt. Cotton gloves provide some protection, but a potholder mitt is safer, although cumbersome for forming. Plastic can also be heated directly over a Bunsen burner. Use scraps of plastic heated to the "gummy" stage to show how it can be twisted, bent, pulled like gum or taffy, and joined. When plastic cools to room temperature, it retains the same shape into which it was formed while it was hot. Some plastics cool more rapidly than others; however, they can always be reheated until the desired shape is attained. The entire piece of plastic does not need to be submerged in the salt or heated over a fire, just the area that needs to be worked.
- There are many tricks of the trade which can be discovered through experimentation and exploration.

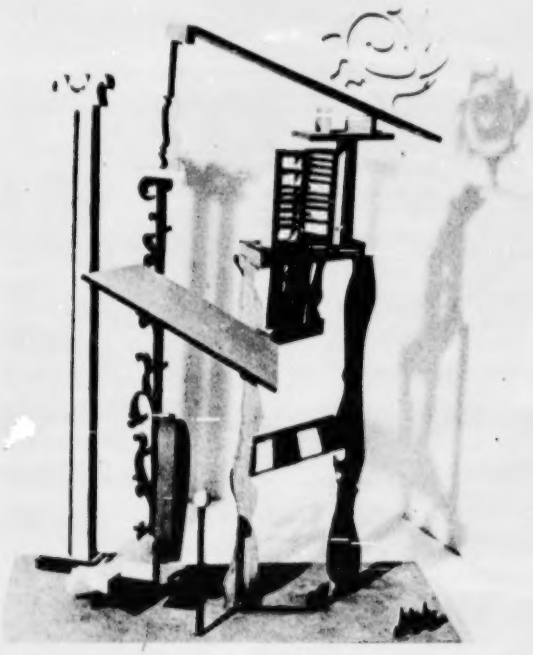
WOOD

Traditionally wood has been a sculptural medium used primarily for carving. It has only been since the early 20th century that sculptors have realized its potential for constructions. The availability of scrap wood, composition board, and driftwood makes wood construction in the round an inexpensive and practical sculptural medium. Construction can be abstract or nonobjective, and the idea can either be planned, or assembled by trial and error. Possibilities for sculptural form in construction are limitless, since there are no rules other than those which govern organization and design.

Demonstrate —

- How to construct with a variety of materials such as scrap wood, driftwood, plywood, composition board, dowels, and balsa sticks
- How free forms of wood can be successfully combined with linear shapes
- Several methods of finishing a piece with wax or oil, and how to rub it by hand to a satin finish





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WELDED METAL

With a welding torch as his tool and metal as his material, the artist of today enjoys a freedom never before realized. Students may feel a kinship with welding which they do not have with the more traditional techniques such as carving, modeling, and casting, because welding is an industrial technique of the 20th century. This method of creating reflects today's world. Since the contemporary artist is concerned with creating three-dimensional structures rather than representing nature or objects, the flame is an ideal tool.

There is usually no attempt made to represent reality. The sculptor either subtly creates the illusion of reality, or is totally abstract. He builds constructions out of pieces of previously cut metal which he brazes or welds together, and is also vitally concerned with exploring new approaches that lead to individual expression.

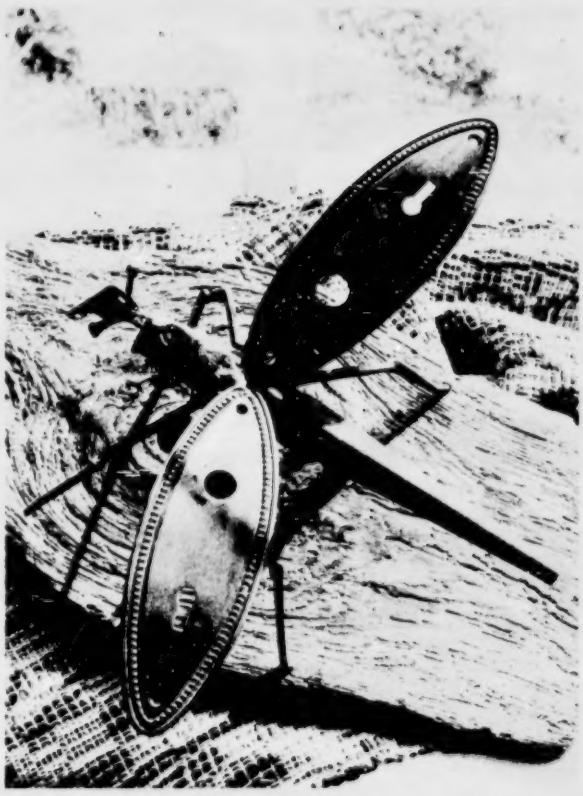
It is suggested that this important but potentially dangerous sculpture activity be explored by discussion and by viewing various examples shown to the class. The actual instruction in this area should be given only by the most competent sculptor-teacher and should be conducted in an area specifically designed for welding. There is no substitute for experience, so the student must work closely under the guidance of a competent leader in a situation which not only provides all essential equipment but also imposes strict rules of safety.

MOBILE

A mobile is governed by a rhythm of balance and motion, and depends upon circulation of air for its ever-changing spatial relationships. Mobiles are effective when simple, hence it is best to limit the number of materials to a bare minimum, such as wire and wood, or mesh wire and metal, or copper wire, sheet copper and copper enameled pieces. Spatial organization, balance, proportion, subject matter, and movement all are involved in the construction of a successful mobile.

Demonstration

- Show and discuss the components of a mobile and the purpose of each. Stress the need to start from the bottom of the mobile and work up. In this way, during all the stages of development the problem of balance is reduced to a minimum. If the procedure were reversed, every time an arm or pendant were added, the mobile would be thrown off balance. Show examples of the mobiles of Alexander Calder.
- Stress the need to keep the mobile responsive to light and to any slight circulation of air. Suspend the mobile to test its sensitivity to air circulation. If the mobile is placed near a wall and lighted in a certain manner, it will cast shadows on the wall, which will help to emphasize its ever-changing patterns and spatial relationships.



- Discuss the wide variety of other lightweight materials which may be effectively used in constructing a mobile, such as reed, tissue paper, cardboard, stained glass pieces, wire, thread, yarn, plumber's tape, fabric, and doweling.

Studio Experiences

Wood

The student might

- Construct a composition of wooden dowels of varying lengths and diameters. Attempt to work out a rhythmic pattern and balance within the composition.
- Develop a relief construction using scraps of various types of wood such as fir, cherry, maple, or walnut. Work out a subtle color relationship using oil or wax stains as a finish.

Found objects

The student might

- Within an old picture frame, build up a composition with various preformed cardboard shapes such as small boxes and tubes, polymer paste, and medium. Create a wide variety of planes and depths by altering the original cardboard shapes. Finish by applying headlines, columns of type, and pictures from magazines and newspapers which seem appropriate to the composition.

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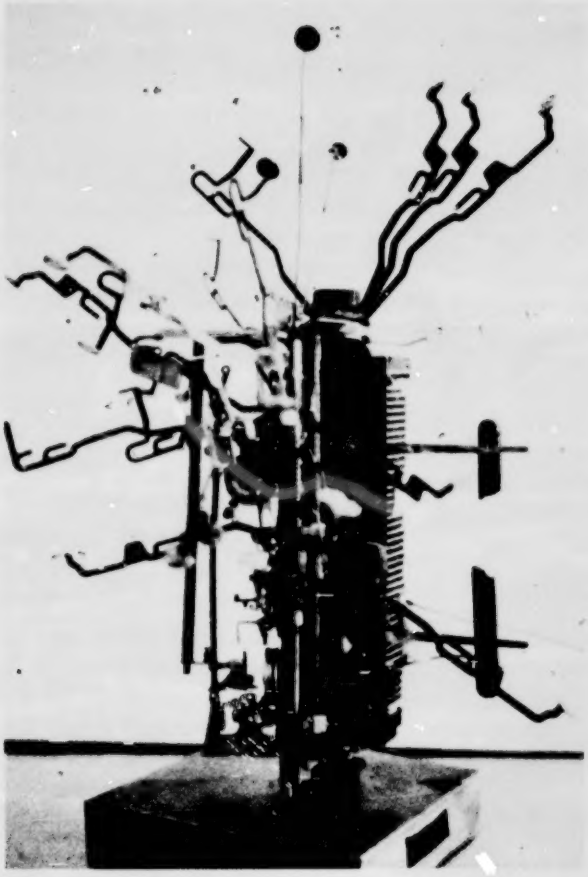

- Collect a number of short wooden strips or a group of found objects (such as dominos, checkers, or tongue depressors) to be joined by glue. Work out a self-supporting construction which minimizes the fact that each piece is the same size. A strong light would provide shadows to further enhance the composition.
- Organize a construction on a suitable base, using related found objects such as nails of various sizes and types, different pieces of hardware, assorted wooden blocks, clothes pins, or objects from children's games. These could be used whole, or could be cut, carved, or altered in some way. Attach parts by using glue, polymer gel, paste, or plastic metal.
- Work out a humorous sculpture of found objects, perhaps an animal or a human figure, using an assortment of unusual defunct or abandoned items. The selection of these items is just as important as their arrangement in the finished composition.

Metal

The student might

- Construct a nonobjective metal sculpture which will stress lines and rectilinear shapes. Emphasize positive and negative spaces as well as the contrast between lines and flat pieces. Various sections may have to be temporarily wired or glued in place as plans for the final arrangement are worked out. The final composition might be finished by using a combination of methods previously demonstrated, such as texturing the flat surfaces and pickling.
- Work out a metal relief sculpture built on a piece of plywood, using only hardware items for joining. Try using sheet metals, tacks, copper tubing, screws, wire, nuts and bolts, washers, and other small hardware items. Drilling, sawing, and filing will be useful during the process.
- Using a combination of techniques demonstrated earlier (such as stretching and hammering), form a sculptural arrangement of overlapping circular pieces of brass or copper which might suggest organic forms. Additional texture could be added by puddling solder on the surface.
- Create a relief sculpture using sheet copper shapes and wire. A preliminary mockup might be first shaped with paper and string. After the copper shapes are cut and filed, textures may be added by stamping or incising various line patterns.

Clay

The student might

- Build a clay construction that emphasizes curvilinear shapes as well as holes.

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- Construct a clay sculpture using leather-hard precut shapes and slip. Work out several preliminary sketches or paper models to assist in planning the structure.
- Design and build a large menorah which will be both esthetic and functional.

Plaster

The student might

- Combine wire, cloth, screening, and plaster into a three-dimensional composition to be a model for a piece of playground equipment which children could safely climb, walk through, slide down, or enjoy in some physical manner. The finished piece might be painted in brilliant polymer colors which would appeal to younger children.
- Design a sculpture of the human figure in action constructed with plaster and cloth over a wire armature.

Plastics

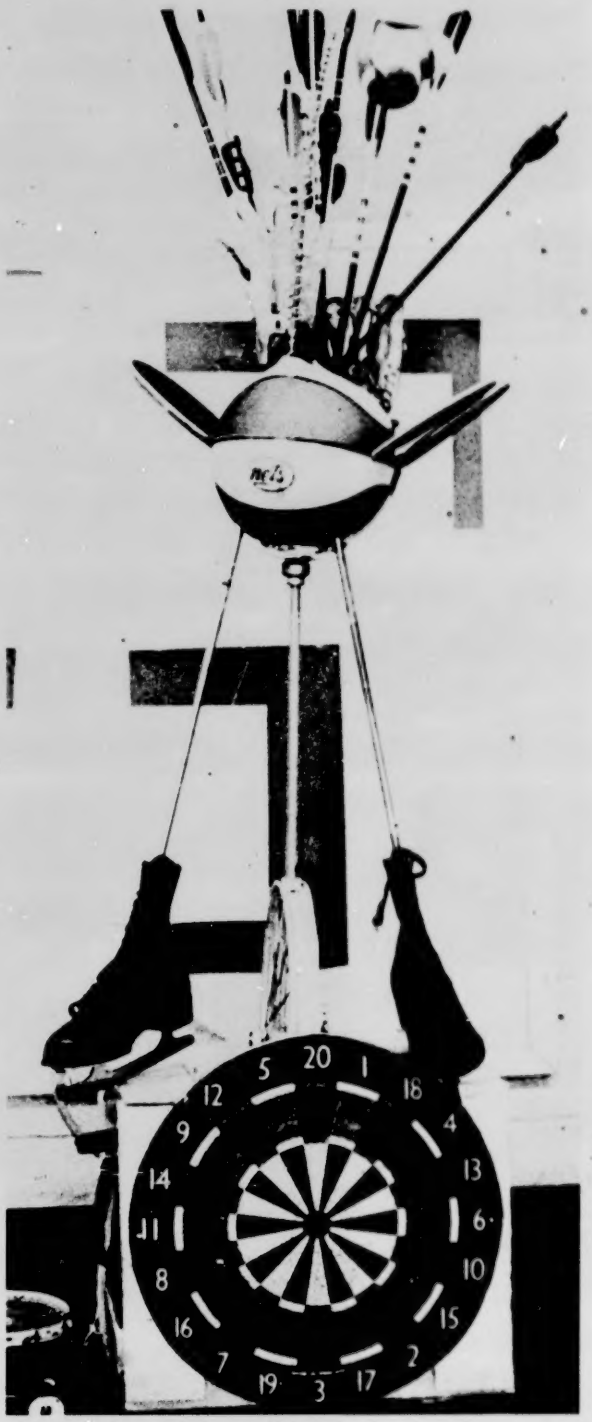
The student might

- Design a nonobjective construction to be built completely of plastics. Work out a preliminary plan or model with oaktag before proceeding to cut and attach the individual pieces. Refer to the methods of handling and joining demonstrated earlier as the project is brought to completion.
- Work out a three-dimensional design which will create an optical illusion. Refer to "op art" compositions of such artists as Richard Anuszkiewicz, Reginald Neal, and Victor de Vasarely. Attempt to produce one or more of the following visual reactions: negative after-images, irradiation, moire, reversible shapes. Plastic dyes or polymer colors may be added to help create the desired effects.

Combination

The student might

- Use materials of individual choice to design and construct a simple composition to pattern light from a single or multiple source. Decide on the direction of the light, then build the structure in the light itself so that it becomes an important part of the composition.
- Create a nonobjective, three-dimensional space construction using several rigid, flat materials such as balsa, plywood, cardboard, sheet metal, sheet plastic, screen wire, or embossed metals. Organize so that each shape relates to other shapes in the construction, negative areas form an integral part of the design, and the characteristics of the materials used are emphasized in the total structure.
- Using wire and scraps of various metals (such as aluminum, copper, and brass), work out a sculpture of the human figure in action. Attach the various pieces by drilling holes and using wire, screws, bolts, or body solder to join them together. The figure should be attached to an appropriate base when completed.



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KINETIC SCULPTURE

The student might

- Investigate various discarded objects and machines that might be incorporated into a sculpture with moving parts, such as a windup phonograph turntable, small electric motors, or magnets.
- Plan and construct a small "junk" sculpture in which several of the parts will move, light up, or do both.

Independent Studio and Research Projects

- Plan and build a large garden sculpture in clay.
- Design a minimal structure (including working drawings) which could be constructed by the class within the school grounds.
- Form a committee to design a "happening" for the art classes, art club, or school in general. (The spectator should become an active participant.) Read and study such activities as have been staged by Alan Kaprow.
- Try converting a room to be used for the exploration of color, light, visuals, and sound sculptures.
- Design a large environmental sculpture to be installed within the school lobby or on the school grounds. Make a detailed plan and scale model so that the structure may be built (perhaps of plywood) in the school shop. Study the works of Tony Smith and Robert Grosvenor before beginning the design.
- Work out a written and visual presentation comparing Dadaism and pop art.
- Do a research project relating technology to the sculpture of today.

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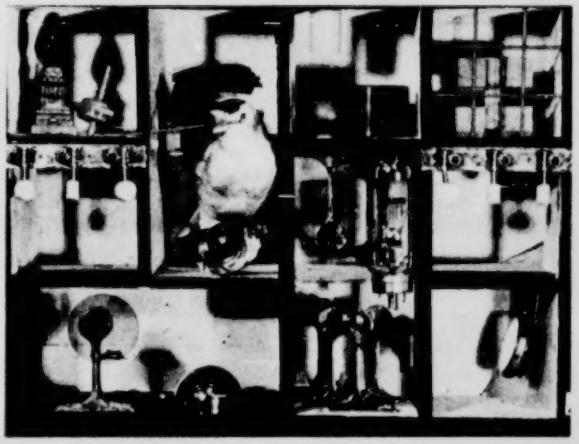
Summary of Understandings and Concepts

- Does the student understand the characteristics of sculpture as a means of individual and social expression?
- Has the student demonstrated sensitivity and skill in using several different sculpture media and techniques?
- Does the student understand the universality of sculpture as it reflects the various periods of culture in the history of man?
- Has the student demonstrated ability in visualizing sculpture as a three-dimensional, stabile, or moving design in space?
- Does the student realize the characteristics and limitations of the various media used in the creation of sculpture?
- Has the student been exposed to a wide variety of examples of contemporary and traditional forms of sculpture?
- Has the student developed an understanding of tactile sensitivity as an integral part of the sculptural form?
- Has the student developed a sensitivity to, and appreciation of, all natural and manmade forms?
- Has the student become familiar and involved with the recent forms of sculpture, such as the environmental, kinetic, optical, and electronic?
- Does the student consider the importance of the interplay of light and shadow in sculpture design?



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Slides

A listing of selective sources of visual materials and services may be found on pages 79–81 of *Studio in Art.*

Sculptor	Title	Material
De Creeft	Cloud	green stone
Michelangelo	Pietá	marble
Michelangelo	David	marble
Flanagan	Jonah and the Whale	stone
Brancusi	The Kiss	stone
Flanagan	Mother and Child	red sandstone
Praxiteles	Hermes	marble
Egyptian (Anon.)	Prince Ankh-Haf	limestone
Zorach	Head of Moses	granite
Nakian	Young Calf	pink marble
Lehmbruck	Kneeling Woman	cast stone
Gross	Reflection	pink alabaster
Modigliani	Caryatid	limestone
Zorach	Head of Christ	black granite
Rodin	St. John the Baptist Preaching	bronze
Rodin	Heroic Head	bronze
Picasso	Woman's Head	bronze
Giacometti	Tall Figure	bronze
Brancusi	Bird in Space	bronze
Boccioni	Anti-Graceful	bronze
Greek (Anon.)	Head of Pugilist	bronze
Greek (Anon.)	Delphic Charioteer	bronze
Mestrovic	Jacob's Well	bronze
Lipschitz	Prayer	bronze
Calder	Spiny Stabile	sheet aluminum
Gordin	Construction #10	painted steel
Hare	Sunrise	bronze and steel
Kelly	Blue Disk	painted aluminum
Lachaise	Head	nickel-plated bronze
Lippold	Variation #10, The Sun	goldwire
Lipton	Menorah	nickel-silver on steel
Stankiewicz	Secretary	steel
Smith, David	Cock Fight Variation	steel
Picasso	Goat	steel
Fuller	String Construction #51	string and aluminum
Bertoia	Sculptured Screen	various metals
Wines	Child in Web	cast bronze
Milonadis	Kinetic Construction	steel
Rivers	Kabuki in Rectangle	welded steel

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Barlach	Composition with Seven Figures and a Head	painted bronze
Hunt	Extended Horizontal Form	steel
Miki	Untitled (ears)	cast aluminum
Kowalski	Dynamite	stainless steel
Marini	Horse and Rider	bronze
Kelly	Blue Disk (primary structure)	painted aluminum
Della Robbia	Madonna and Child	glazed terra cotta
Grippe	The City	terra cotta
Noguchi	Even the Centipede	clayware
Yagi	A Cloud Remembered	ceramic
Noguchi	Cronos	balsa wood
Nevelson	Royal Tide I	gilded wood
Kohn	Square Root	wood
Baskin	Man with Dead Bird	walnut
Baskin	Walking Man	oak
Moore	Two Forms	pynkado wood
Arp	Relief	wood
Dubuffet	Bearded Head	driftwood
Kipp	Andy's Carte Blanche	plywood
Barlach	Revenge	wood
Barlach	Peasant Girl	wood
Morris	Untitled primary structure	painted plywood
Smith, Tony	Untitled primary structure	painted plywood
Gallo	Man in Rocker	polyester resin
Reimann	Constellation	plexiglass
Weinrib	Stadium	plastic
Yamaguchi	The Port	acrylic plastic and light
Gabo	Construction	plastic and wire
Marisol	The Wedding	mixed media
Miro	Relief Construction	wood and metal
Oldenburg	Soft Engine Parts	mixed media
Bill	Untitled Sculpture	glass, metal
Westermann	White for Purity	plaster, glass, wood
Rauschenberg	Coca Cola Plan	mixed media
Chryssa	Fragment for the Gates to Times Square	neon and plexiglass
Segal	The Cinema	plaster and mixed media
Tinguely	Dissecting Machine	various materials
Antonakos	White Hanging Neon	neon and aluminum
Yoshimura	Two Columns	plaster on wood
Grosvenor	Still No Title	plywood-fiberglass, steel
Bell	Untitled Sculpture (primary structure)	glass, metal
Grosvenor	Transoxiana	wood, polyester, steel
(Anonymous)	Examples of African Tribal Sculptures	various materials

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STUDIO IN CERAMICS

COURSE DESCRIPTION

The ceramics course is designed for the student who is interested in working with clay. It includes the use of the potter's wheel, the creation of ceramic sculpture, the properties of glazes, the use of available domestic raw clay as well as commercially prepared products, experimentation with the various methods of handling clay, and a study of the history of ceramics and the contemporary uses of clay.

While *Studio in Ceramics* was designed as a year's course, a pupil may take it for half a year with consent of the head of the school art department. The course should cover as many approaches to the use of clay as possible, allowing time for the student to explore methods of greatest interest and value to him.

The use of photographic illustrations, examples of ceramic work, museum trips, and studio observation should be included. Independent research and reports should be used as part of the classwork. The students should keep notebooks of their classwork and research, as well as portfolios containing sketches, photographs, and color transparencies of their work.

The student activities included are only suggestions of the type of activities that might be included.

INTRODUCTION TO CERAMICS

The Nature and History of Ceramics

The word ceramics comes from the Greek *keramos*, meaning potter's clay, and refers to the art of making both useful and beautiful objects such as bowls, sculpture, cooking and serving utensils, tiles, electric insulators, components of spaceships, bricks, and many other objects used by man.

Pottery uses the earth itself, and every culture that ever used clay formed it in its own particular manner.

Clay varies in color and texture. It feels smooth and sometimes a little oily; it contains minerals and is either residual or sedimentary in geologic origin. Moist clay can be molded into any form. Heated to the right temperature, it hardens and serves many useful and aesthetic purposes.

Ceramics is one of the oldest of man's arts. One piece of prehistoric pottery, still in good condition, is considered to be at 10,000 years old. Pieces of pottery discovered by archeologists have added to our knowledge of ancient cultures.

The Egyptians and the people of the Tigris-Euphrates Valley had an abundance of clay, for as the rivers overflowed over the centuries, they left large clay deposits. People in these regions made bricks for houses and, as far back as 3,000 year ago, they acquired a knowledge of glazing, developing the vibrant blue copper glaze for which their work is noted. Bowls, figurines, jewelry, and even writing tablets were also made from clay.

Greek pottery is famous for its beauty of form and decoration. The Greeks during the fifth and sixth centuries B. C. made beautiful vases of carefully proportioned shapes and sizes which were used for measures, storage of food, prizes, and religious ceremonies. The surface decorations were designed to fit the curved surfaces with perfection never equaled.

The Chinese developed porcelain using a white clay called kaolin mixed with feldspar, silicate of alumina, and potash. Porcelain is white, translucent, and comparatively dense. To the Chinese, fine pieces of porcelain were as valuable as objects of gold and jade. To the historian, they indicate an advanced culture with a deep sense of beauty at a very early period in man's history. Chinese porcelain or chinaware was known in Europe by the 15th century, but was a great rarity.

In the late 1600's, the Dutch East India Company brought Chinese porcelain to Holland. This greatly influenced the Delft pottery makers, who could not copy the Chinese porcelain but could copy the designs and did so in an oriental blue on a thin, white body. Early in the 18th century the secret for making porcelain was discovered and its manufacture began both on the Continent and in England.

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In Italy, a tin-enameled earthenware was made as early as the 14th century. In Florence, majolica ware, a white earthenware with bright colors, was developed. The finest pieces were large plaques and plates with pictures on them. The art of majolica was lost by 1570.

The work of the Italian pottery makers, particularly from Faenza, had a strong effect on the pottery of France, where French faience (also a tin-enameled ware) was produced. The French developed their own style, and from cities such as Nevers and Rouen came works of skill and beauty. Often the paintings of such artists as Watteau and Boucher were copied on faience plates. During the 16th century, the French potter Palisay discovered ways of making colored lead glazes.

In Germany, salt-glazed stoneware was developed, which was suited to the large jugs used to hold beverages.

A German potter produced the first true European porcelain in 1709. A factory established at Meissen produced the delicately modeled porcelain figurines in finely detailed costumes, which came to be known as "Dresden China."

In England, potters such as Wedgwood and Spode each contributed to the making of pottery, Wedgwood with his jasper cameo, and Spode with his boneware. In the village of Chelsea, beautiful soft-paste porcelain figurines were made that became very popular.

Royal Copenhagen china and china figures were collected the world over. Animals, birds, and children were favorite subjects and beautifully done.

In Scandinavian countries, the craftsman is encouraged and respected. His work is displayed in museums everywhere and is bought and enjoyed by Americans as well as Europeans.

Indians in North and South America made interesting bowls, pipes and figures, but the work of the Indians of the American Southwest is outstanding and is produced today just as it was hundreds of years ago. Maria Martinez, a potter of pueblo San Ildefonso, is noted for her pots, decorated black on black.

The American colonists used local clay to make pottery which was rather heavy and breakable. In time, excellent pottery was developed, and at present American pottery products are comparable to the best in other countries. Several well-known producers are located in New York State, and there is a college of ceramics at Alfred University.

Some widely known names in the American pottery field are Syracuse, Onondaga, Iroquois, Steubenville, Franciscan, Lenox, Rockwood, Shenango, Van Briggle, Newcomb, Baggs, Cowan, Scheier, and Wright.

Discussion

- Have the class observe and discuss the numerous ceramic objects in the classroom and home.
- Discuss with the class what has been learned of man's history from the study of ceramics.
- Present examples of clay in the various stages from the raw form through fired and glazed pieces. Discuss the entire process with the class.
- Display and discuss the various kinds of ceramic materials currently in use.
- Define and discuss the technical terms used in the field which are relevant to the work that the student will be doing.

The Making of Ceramics

The design is important in creating with clay and should grow out of a feeling for the organic quality of the clay. All of the fanciful decoration, finishing, and glazing will not help unless the shape itself is interesting.

Red, buff, or brown clay is best for all student work. These clays (especially with grog added) are naturally rich in color and texture and respond well to hand building. Usually a clay form or the exterior of a pot will be rich and attractive without glazing. A glaze may be applied to the inside, however, so that the object will hold water.

White talc clays are not very satisfactory for throwing, since they are difficult to work on the wheel and, when fired, they lack the rich color and textural qualities of other clays.

Forming clay in the hands offers endless possibilities for shapes that cannot be reproduced on the potter's wheel. A student can learn to express himself in a very original way when forming pieces by hand alone. The clay readily takes on the stamp of the artist's personality.

Wedging

Demonstration and Discussion

Using a good quality, moist clay and a wedging board covered with canvas or oilcloth, demonstrate and discuss various wedging processes. The following points should be emphasized:

- Wedging is the technique of kneading moist clay by hand to give it the same consistency throughout, and to add or remove moisture as necessary.
- Clay should not be wedged on dry plaster. Such a surface absorbs excessive moisture and can make the clay uneven in consistency.
- It is very important to cut the clay to check for air bubbles.
- Clay should be stored in rustproof, airtight containers such as polythene bags, zinc-lined cans, or plastic waste cans.

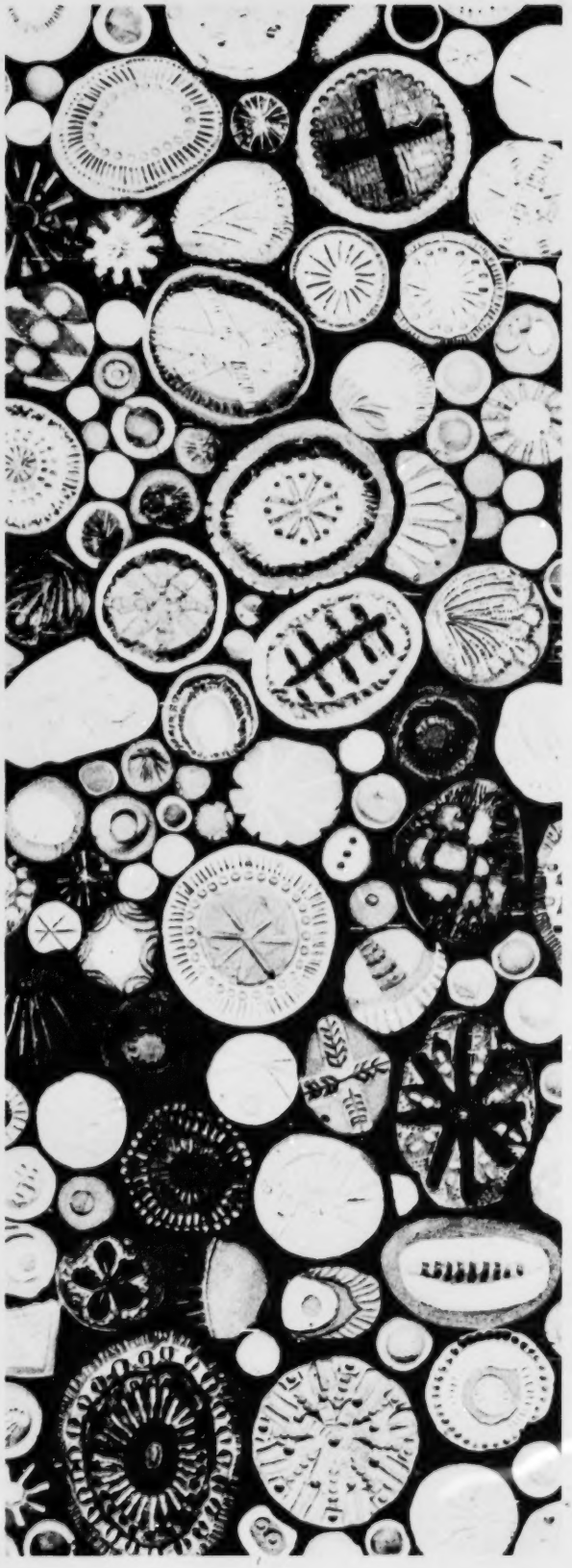
Texturing

Demonstration and Discussion

Before turning to the conventional methods of forming clay, such as the pinch pot, coil, and slab methods, it might be helpful to present a short lesson on texturing so that students may become familiar with the "feel" of the medium.

Assemble a large variety of objects and tools which may produce unusual textures when impressed in the clay. When exploring texture, it is a good idea for students to roll out several small pieces of clay in a variety of sizes for experimentation.

- Demonstrate and discuss the endless number of patterns which may be used, not only as decoration, but as an integral part of the whole design of a particular clay project.
- Demonstrate the following techniques:
  - Using the fingers as tools
  - Pressing into clay found objects such as a fork, a piece of bark, twigs, small shells, blocks of wood, and rope
  - Impressing a design into the clay by using a roller such as a pie crust crimper, a pizza cutter, a caster, or a spool into which designs have been cut
  - Carving the clay with a fettling knife, a paring knife, and various gouges and cutting tools
  - Building up the texture by dribbling or painting slip onto the surface
  - Creating high relief by adding various pieces and bits of clay



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Pinch Pots

Demonstration and Discussion

- Demonstrate and discuss building clay pots and forms by the pinch pot method, beginning with a ball of clay the size of an orange and forming a pot by revolving the clay ball while pressing the thumb into the center. Making a pot through this method is good exercise for the hands and is one of the simplest ways to become acquainted with the plastic quality of the clay itself.
- Students should be reminded that timing is important in all clay work. Exposure to air and the heat of the hands tends to dry the clay too quickly, so hands should be moistened periodically while forming the pinch pot.
- Demonstrate the joining of two pots. By wetting the rims and welding these edges together with fingers or a small tool, air is trapped within the form. The form may then be slapped or paddled smooth, or textured. After the piece has become firm (perhaps overnight), a hole should be added to allow the air to circulate. Another piece may be used to form a base by adding slip to both surfaces, then welding a coil along the joint. Other possibilities include adding necks, feet, handles, or joining several small pots to make a multiple-pot construction.

Coil and Strip Construction

Demonstration and Discussion

Demonstrate and discuss the building of clay forms by the coil or strip method, covering the following points:

- The coils or strips themselves should help to determine the shape and surface of the object.
- There is no need to attempt to create a perfectly circular pot when this can be done more readily on the potter's wheel.
- Large coil constructions stand up best when grog is wedged into the clay in the preliminary stages.
- When forming the coils or strips, the student should bear in mind the size of the object he is constructing.
- As the shape evolves, it may be altered or rearranged.
- Timing is extremely important, since there is a practical limitation upon the number of coils that can be added at one time without causing sagging. It is also essential that the first portions of the construction not be permitted to dry until the entire piece has been completed.
- By lightly beating the surface of the clay form with a stick, paddle, or spoon, one can reshape sagging or awkward areas.

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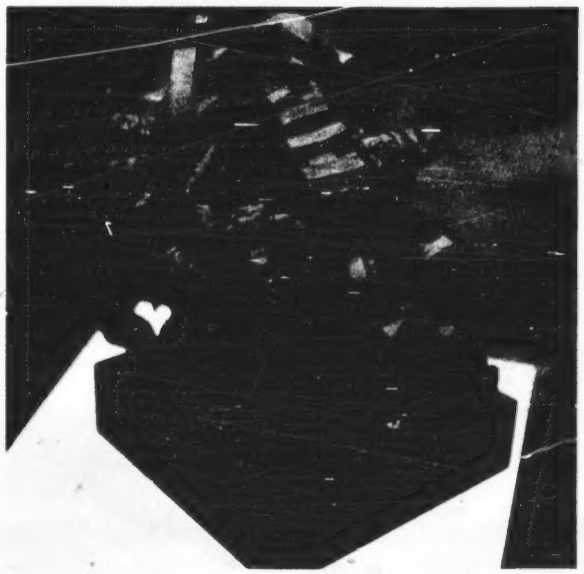
Slab Construction

Demonstration and Discussion

Demonstrate and discuss the many ways of using the slab-building technique. This is actually the most versatile of all construction methods. A slab of clay does not usually retain its shape without support unless it is standing on end. The consistency of the clay and the thickness of the slab determine the weight a slab wall will support. Because of this, support is usually needed during the construction process. This support may be provided by draping the clay into a student-made mold; around a folded newspaper, magazine, or cardboard tube; over a plastic bag filled with sand or over a "found" mold; or into a sling mold. All of these supports offer great opportunity for free-form construction and pot-making.

Stress the following points:

- It is usually best to place a thin sheet of cloth, paper toweling, or plastic between the clay and the support to keep the clay from sticking to the support.
- When clay is draped over a support, it must be removed when firm but not yet dry. If allowed to dry, the shrinking clay may crack, for the support will not necessarily shrink with it.
- The slab form can have no undercuts if the support is to be removed in one piece.
- It is best that pieces be added or joined when both clays are of equal consistency, firm but not dry. Through the use of slip, a strip may be welded into both sides of a joint.
- When joining several pieces together, the joint itself and the way chosen to join the pieces can become an integral part of the total piece.



Sculpture and Constructions

Demonstration and Discussion

Discuss and demonstrate the designing and assembling of forms for a free-standing sculpture or construction. It is only after making many pots and joining small pieces that the more complex structures should be attempted.

Include the following concepts:

- Several preliminary sketches may help to develop the project effectively.
- Before the student begins, he must be sensitive to form, balance, proportion, and function. A point of departure might be to join similar forms.
- It is important to know exactly how wet or how dry clay must be for bending, paddling, stretching, or welding.
- Expertness is required in welding wedges and seams so that they will not crack in drying or firing.

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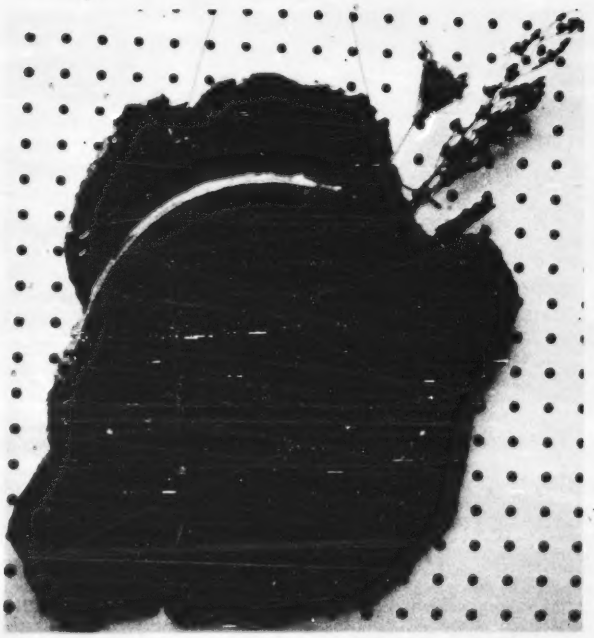

- The various shapes to be assembled for this construction can be made by any of the processes previously described. It is better, however, if these pieces are of similar thickness and dryness. Various pieces may be textured before being joined.
- Slow, uniform drying prevents unequal stress and is an important consideration in preventing cracking of welded seams or warping.

Making a Mold

Familiarize the student with the process of making a mold for simple slab draping, for slumping or pressing, as well as the more complicated two- and three-piece drain mold.

Studio Experiences

TEXTURE

The student might

- Roll out a slab of clay and cut into many small tiles of various sizes. Experiment in the texturing of each of these pieces. Some textured pieces could be fired and some glazed; they could then be arranged to create an interesting wall panel.
- Design a group of thin, textured pieces to hang as a wind chime. Note the tonal characteristics of the different clay bodies, and how the densities produced at different firing temperatures affect the tone.

PINCH POT

The student might

- Create a variety of small pots to be suspended by means of a rawhide lace fastened around the necks.
- Design a group of bells with clappers to be hung as a mobile.
- Develop a small, amorphous sculpture about the size of a baseball, using only the hands. Hollow out and fire.
- Design a simple pot with multiple necks.
- Push, pull, and twist a lump of clay into an interesting form that combines positive and negative areas, including holes.

COIL OR STRIP METHOD

The student might

- Build a life-size ceramic head. A plastic bag filled with sand, sawdust, or vermiculite may be used as a support.
- Build a large pot in which the coils are purposely emphasized as a design element.
- Build and carve a deeply textured or incised pot, container, or free form.

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- Build a multiple-pot decorative piece or vase.
- Design and build a large pot with a pouring lip and handle.
- Construct a large, hollow animal or abstract form by the coil or strip method.

SLAB METHOD

The student might

- Construct a stabile or wall relief using a geometric or free form as a point of departure.
- Construct a large plate or bowl by draping a clay slab. Design matching service pieces.
- Make a tool for creating impressed designs in clay to be bisque fired.
- Using welded slabs, create a sculptural piece or a utilitarian object.

Independent Studio and Research Projects

- Build a self-portrait head, using terra cotta clay mixed with coarse grog.
- Design and make a ceramic wall panel. (This might be done as a group project for the school.)
- Design a piece suitable for casting. Build a mold and cast a set of matching pieces.
- Collect clay locally if it is available. Screen out impurities and build a pot by any selected method.
- Design and create a group of ceramic jewelry pieces. Experiment with Egyptian paste.
- Design and make a chess set, using an appropriate method of shaping clay.
- Collect or examine samples of pottery designs such as Royal Copenhagen, and tell why you would like a particular pattern for your own dinner table.
- Design and build a large patio lantern or outdoor sculpture.
- Contrast or compare the work of modern potters of Denmark, Sweden, Finland, and the United States.
- Create a human figure in an expressive position, consistent with the inherent qualities of clay.

00045

Throwing on the Potter's Wheel

The wheel is almost as old as pottery itself. Evidence has been found that a crude potter's wheel was used as early as 4000 B.C. It was devised as a large, flat disk which was slowly rotated by a helper. On this wheel the potter shaped the clay. Such wheels are in use today by many primitive peoples of the world.

Because of changing conditions, the potter's wheel is no longer the standard commercial method of producing pottery. In many cases, throwing is used as an aid in developing ideas that may result in the making of a mold for mass production.

The goal of almost every person interested in pottery is to be able to successfully throw a piece on the potter's wheel. A ball of soft clay is placed on the wheelhead and the hands shape the clay as it is being thrown outward by the centrifugal force of the revolving wheelhead. While electric-powered wheels are very popular in the United States, many craftsmen still prefer the "kick"-type wheel. The kick wheel adds one more element to the process of throwing on the wheel, since in addition to the coordination and concentration required for the hand operation itself, the potter must concentrate on the kicking. To become expert on the wheel requires years of patience and experience. A student can, however, gain much enjoyment and satisfaction from throwing if he is willing to spend the necessary time practicing.

000 46

Demonstration and Discussion

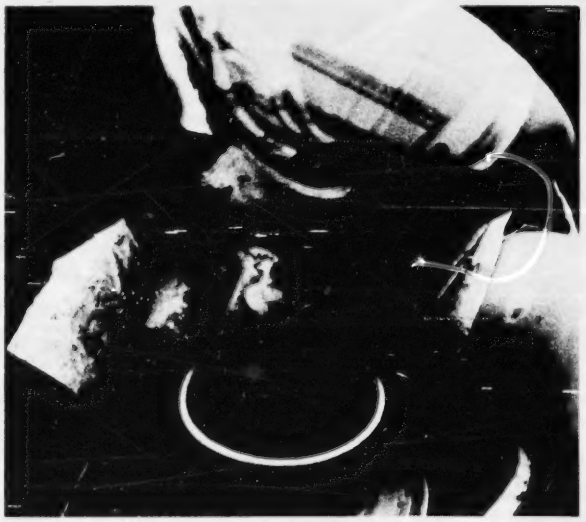
- Using a lump of wedged clay, demonstrate and discuss the art of centering and softening, or plasticizing the clay, and opening, raising, and forming the pot.
- The following should be emphasized:
  - It is very important to condition the clay thoroughly by wedging, allowing time for seasoning.
  - It is more convenient if the artist works on a moist plaster bat anchored on the wheelhead. In this way, the entire bat may be removed with the piece on it when the product is completed.
  - No piece can be formed unless the clay is properly centered.
  - The potter's hands must be kept wet during the entire process, but water should not be permitted to gather inside the piece.
  - In opening and raising, pressure should always be applied gently, and the hands released slowly. Any quick or jerky motions could throw the piece off center.
- Using a leather-hard piece which has been thrown on the wheel, demonstrate and discuss the art and purpose of turning, including the following techniques:
  - inverting, centering, and anchoring the piece
  - finishing and hollowing the base
  - trimming off excess clay with metal turning tools
  - use of support for the arm or hand

Studio Experiences

- After the students have practiced the basic technique of throwing, they should progress through a series of exercises that cover most aspects of thrown forms, including:
  - cylinders of various heights, widths, and thicknesses
  - spheres with various sized necks
  - shallow dishes or deep bowls
  - tall vases
  - knobs

Independent Studio Projects

- Throw a tall cylinder on the wheel. Throw a series of small cylinders and knobs which may then be added to the original structure to form an abstract construction. Experiment with warping or otherwise modifying thrown forms.
- Throw a small bowl and add handles and a cover.
- Combine a series of thrown pieces to create a pot designed to serve a specific purpose.
- Throw a heavy jar and use turning tools to create a surface pattern.
- Throw a series of matched forms designed for a specific use.



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Decorating Unfired Pieces

Demonstrate and discuss various techniques of decorating on moist clay, leather-hard clay, and greenware. Include impressed designs, incised designs, slip painting, stenciling, trailing, mishima, sprigging, and sgraffito. Emphasize the strengths and weaknesses of one-step firing.

Firing

As part of this course each student should have experience in stacking and firing the kiln. This must always be done, however, under the direct guidance and presence of the art teacher.

Demonstration and Discussion

- Discuss with the class the complete bisque-firing process, including the physical and chemical changes that take place, completely changing the properties of the clay.
- Be sure that students understand:
  - the importance of having each piece completely dry before firing (this may take several days or weeks, depending on the size and thickness of the piece)
  - the method of stacking the kiln
  - the importance of the slow firing period, beginning with the kiln door slightly open, allowing water in the form of steam to escape from the kiln
  - reasons why it is not desirable to bisque-fire and glaze-fire in one operation
  - the cooling period, cracking of the kiln, and the removal of pieces

Glazing

Too often the student feels that the only good ceramic product is a highly glazed, glossy product.

The bulk of student ceramic activities should be designed so that all glazing is an integral part of the whole design, rather than merely "frosting [what may be] a poor cake." In many cases, parts of a project may be glazed while others are left natural. Students should be encouraged to appreciate natural clay, slips, and stains as well as the high-gloss glazes. Many of the most effective art glazes are heavily textured and have either a matt or semi-matt finish.

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Demonstration and Discussion

- The teacher should set up a progressive display to compare bisque ware, glazed bisque before firing, glazed ware after firing, and pieces decorated by various combinations of glazing and other techniques of decoration, such as underglazing, overglazing, stenciling, brush painting, wax resist, and sgraffito.
- Discuss the entire glazing process from powdered or liquid state to fired glazed ware. Stress the following points:
  - Glaze is a hard, nonporous finish that may be colorless or colored.
  - Glaze may be opaque (as in majolica) or transparent, with or without color. It may have a glossy, matt, or semimatt finish.
  - It is vital that the glaze chosen fit the body of the clay. Glaze should be so selected that it matures at a temperature or cone no higher than the clay to which it is being applied. It may mature at a much lower temperature.
  - Most glazes contain certain toxic material and should not be inhaled. Also, prolonged contact with the skin, especially where the skin is broken, should be avoided.
  - The most effective glazing is done on bisque ware. Glaze may, however, be applied to greenware, which saves time and cost but might result in accidental damage to all pieces within the kiln.
- Demonstrate the many basic methods of glazing, including brush application, pouring, dipping, sponge application, and spraying. Emphasize the following points:
  - If a prepared glaze chart is not available or if glaze is being mixed by the artist, a small test piece should be fired.
  - Thickness of glaze depends upon many factors, which the artist will realize only through experience. For example, if the bisque ware is extremely porous, a thick application will cause pinholes and unsightly running during firing.
  - Dipping is suitable when glazing a number of small pieces of similar size and shape.
  - Glaze for the interior of bowls and pitchers may be easily poured.
  - For spraying glazes, a booth with an exhaust fan is a necessity, and the student should wear a protective mask.
  - Careful records should be kept of all glaze mixtures, firing times, and temperatures. Labeled test pieces should also be kept.

Studio Experiences

The student might

- Experiment with various methods of glaze application and glaze combinations.
- Experiment with various ways of decorating pots, including underglaze, wax resist, and overglaze.
- Try using the potter's wheel while glazing, brushing, and pouring.
- Appropriately glaze pieces created during the course, making certain that in each case the pot, its decoration, the glaze, and the mode of application work together to create a unified whole.

Evaluation

- Has the student had the opportunity to explore and create with each of the hand-building processes presented in class?
- Has the student made the effort to dig and process his own clay?
- Has the student demonstrated his ability to successfully throw on the potter's wheel?
- Does the student's conversation and written work demonstrate an understanding of the ceramic vocabulary?
- Does the student's ceramic work reflect an understanding of design?
- Has each student had the opportunity to help stack, observe, and fire the kiln?
- Has the student explored several different glazing processes in finishing his pieces?

Also, in creating his designs the student should see that the actual mass and weight of the ware are consistent with the visual mass and weight. The pot should carry its own weight gracefully and not appear to sink into its base. The piece should be attractive from all sides and should possess a satisfying tactile quality.

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Glossary of Terms

adobe a heavy, textured clay soil used chiefly as a building material but sometimes used in general ceramics.

alumina an oxide of aluminum in the form of a white powder or crystalline substance. It is used chiefly as a refractory and an abrasive.

bisque unglazed but hard-fired ceramic ware

ceramics 1. The art of fashioning clay into artistic, ornamental, and/or useful artifacts. 2. Ware made from clay by shaping it while moist and firing it in a kiln or oven at high temperatures. Sometimes includes the use of glass.

clay a widely distributed, colloidal, lusterless, earthy substance. It is plastic when moist but permanently hard when fired. It consists of decomposed igneous and metamorphic rocks rich in feldspar, whose essential constituents are kaolin and other hydrous aluminous materials.

crawling a defect of glazing caused by dust or grease, whereby the glaze appears to recede or draw back, leaving exposed unglazed areas.

earthenware vessels and ware made from a low-fired clay, usually not white; soft, porous, opaque, and commonly glazed

engobe white or colored slip applied generally to earthenware as a support for a glaze or as a finish in itself

feldspar a group of white, blue, or greenish minerals closely related in crystalline form. On decomposition, they form a large part of the clay in the soil, and the mineral kaolinite.

glaze a glassy compound used for coating clay products. It contains silica, usually alumina, alkalies, lime, and sometimes other ingredients such as coloring agents. Applied by dipping, brushing, or spraying, and is fired in a kiln. Protects, decorates, and waterproofs the surface.

glost glaze

greenware air-dried, unfired pottery

grog fired refractory material that has been crushed and pulverized. Mixed with moist clay to reduce shrinkage during firing to eliminate internal strains, thus preventing warping, cracking, and blow-ups in large pieces. May be used for textural effect.

intaglio a technique whereby a design is depressed below the surface of the material; sometimes used to decorate a ceramic surface.

kaolin a fine, white clay resulting from extreme weathering of aluminous materials such as feldspar. It remains white on firing and is used chiefly in porcelain and as an adsorbent or filler.

lead glaze a glaze containing a high proportion of lead oxide

leather hard the condition of dryness and texture when greenware is firm enough to hold its shape but soft enough to be carved or tooled

porcelain a fine ceramic ware that is very hard, white, translucent, and nonporous. Made of kaolin, quartz, and feldspar in a single firing at very high temperature.

pottery 1. The art of the potter. 2. Ware made from clay that is shaped while moist and pliable, then hardened and glazed by heat in a kiln.

pyrometer an instrument for measuring temperatures beyond the range of thermometers. Works by the principle of increased electrical resistance in a metal when heated. In an electric kiln the pyrometer may be part of an automatic system which maintains a certain temperature, then turns off after a specified period of time.

pyrometric cone any of a series of pointed, clay wedges designed to soften and bend over successively as the temperature in the kiln increases during firing. Used

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to determine when the kiln has reached the desired temperature.

salt glaze a glaze formed on hot ceramic ware in the kiln by the reaction of sodium chloride vapor, steam, and silica

sgraffito decoration produced by scratching with any instrument through to a contrasting surface layer (clay, engobe, or glaze). Usually followed by a firing process.

silica a chemically resistant dioxide of silicon. Occurs naturally as quartz and similar substances; commonly found in the form of sand. Can be produced artificially as a fine white powder or in colloidal form. Used chiefly in making glass, ceramic glazes, and heat-resistant ceramic materials.

slip a mixture of fine clay and water, the consistency of thick cream, used in the ceramic casting process. Also used to join moist pieces of clay coils, slabs, handles, and surface decoration.

terra cotta a porous clay of yellowish- to reddish-brown color

tin glaze an opaque glaze made of an oxide of tin or tin ashes; used on pottery

Equipping the Ceramic Area in a Multipurpose Art Room

The complete process from moist clay to fired glazed ware should be carefully analyzed during the planning of this ceramic area. In this way the teacher may organize the ceramics area in the most efficient and practical manner. The size of the kiln and damp cabinet, the number of potter's wheels, and the amount of materials to be ordered will depend on the situation in the particular school system. When ordering ceramic equipment, it is vital that the teacher write exacting specifications for all items of equipment.

Electric Supply

A kiln requires a 220-volt electrical outlet in the art room. As a general rule, 220-volt, 50-ampere single-phase electric supply or its equivalent in three-phase service should be provided for electric kilns up to 6 cubic feet in capacity. For electric kilns between 6 and 10 cubic feet in capacity, 220-volt, 100-ampere single-phase or its equivalent three-phase service should be provided.

Appliances such as potter's wheels or grinding wheels usually require 110-volt supply lines. When a building is constructed or the art room remodeled, provision should be made in the room for an above-average number of electrical outlets in the equipment area.

Washing Facilities

Ample washing facilities should be located within the ceramic area. A large plastic or galvanized pail of water should be maintained next to the sink for rinsing clay-covered tools and hands before washing them at the sink. This procedure will keep the drain from becoming stopped up. A sediment trap should be installed in the sink.

Safety Practices

Safety instructions concerning the use of all tools and equipment must be an integral part of the discussion and demonstration.

Stress the chief areas of concern:

Firing the kiln

- The outside of the kiln is very hot during firing. The teacher should caution students never to touch a kiln during the firing process lest a student suffer a serious burn.
- The "peephole" is a danger area. Placing the eye close to the hole could cause serious eye injury. Anything stuck in the hole will ignite.

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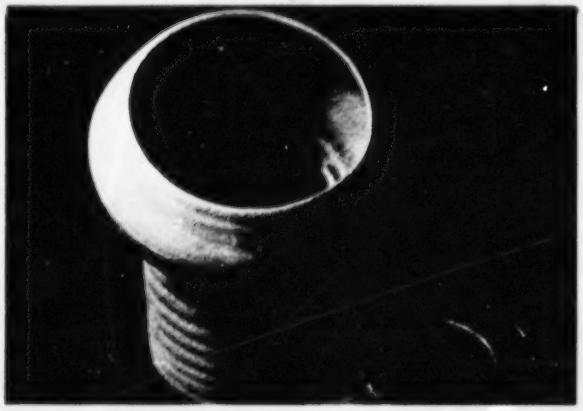

- Electrical controls should be operated only by the teacher.
- The kiln door should be opened only by the teacher.
- Pieces of glaze stuck to stilts or shelves are often very sharp and might cut the fingers.

Grinding

- Students should wear protective goggles when grinding or when present in the grinding area.

Potter's wheel

- The floor should be kept clean in the working area. This area can become very messy and even slippery if clay is dropped on the floor.

General

- Students should not operate any equipment without the guidance and permission of the teacher.

SUGGESTED READING

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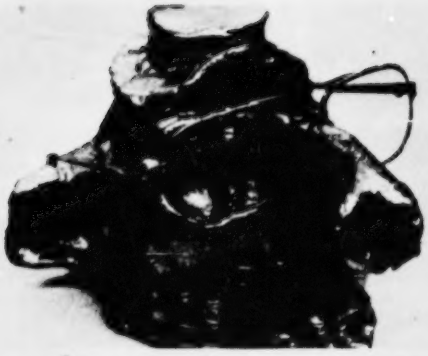

Suggested Equipment List

Firing

electric kiln and accessories:

Top-loading kiln with a firing chamber 20 inches wide, 20 inches high, and 20 inches deep. Two kilns of this size are often preferred to one larger kiln if classes are large. These kilns may be equipped with kiln starter, kiln guard, pyrometer, kiln sitter, or combination of pyrometer and automatic cutoff—depending on the preference of the teacher.

damp cabinet
drying rack
furniture (stilts and triangles)
kiln cement
kiln shelves and shelf supporters
kiln wash
standard pyrometric cones

Clay working, decorating, finishing

decorating brushes
elephant ear sponges
fettling knives
handgrinding wheel
modeling tools (assorted)
modeling and decorating wheels (8″)
potter's wheels
rolling pins
sgraffito tools
sheepswool sponges
storage crocks or cans (large)
throwing ribs (wood)
wedging boards
wheel turning tools

Spraying

compressor
protective masks
spray booth with filters
spray gun

If dry glazes are to be used:
mortars
pestles
precision scale
sieves

Other Supplies

canvas or oilcloth (18″ x 24″)
clays (moist or dry)
terra cotta
buff
white
engobes
grog (coarse and fine)
plastic bags
glazes (liquid or dry)
clear
crackle
gloss
matt
semimatt
textured
slip (various colors)
underglazes and overglazes

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STUDIO IN JEWELRY AND SILVERSMITHING

INTRODUCTION

The design, fashioning, and rendering of objects from metal and combined materials employs the same basic elements of artistry and craftsmanship that are common to all forms of art.

The student should be encouraged to incorporate knowledge from one art experience to another.

High school students are capable of doing sophisticated work, and the acquired skills of the instructor in jewelry and silversmithing will help them to create superior work.

STUDENT OBJECTIVES

Upon satisfactory completion of various segments of this course of study, a student should be able to demonstrate:

- the ability to saw, drill, solder, forge, and polish
- the techniques of chasing and repoussé
- the technique of enameling
- the design and production of a piece of hollow ware
- the design and production of a cast work

Approaches

There are diverse approaches to jewelry creation and silversmithing, and the diversity of approach allows the student a personal and individual involvement.

One approach to the creation of jewelry may stem from the humanistic need for personal adornment and enhancement of the individual. The unique characteristics of the wearer are of prime consideration to the design. From the earliest times man has adorned himself with found objects of special interest and significance, and has fashioned the materials of his culture into various styles of jewelry. This is true today also, and the changes which have occurred in jewelry style are a result of changing technology and vogue.

Another approach is concerned with the creation of ceremonial, symbolic, or commemorative objects which may reflect a religious or historical significance. Liturgical pieces, trophies, awards, insignia, and symbols of honor and office are examples of this approach.

The utilitarian approach stimulates the creation of objects that serve a useful purpose. Containers such as goblets, chalices, boxes, bowls, pitchers, or flatware such as trays, eating and serving utensils, or constructed pieces such as candlesticks, bookends, salt and pepper shakers, are but a few of the objects to be considered. The utilitarian approach may be combined with any of the other approaches. Some examples include buttons, belt buckles, tie and hair clasps, and cuff links, or liturgical chalices and commemorative containers.

The esthetic approach is concerned with visual and tactile effects and the creation of objects which appeal to the senses. Relief wall hangings, small sculptures, and mobiles could be included in this approach.

The examples mentioned should stimulate each student to explore and pursue what is significant to his own needs.

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Design

The major origins of jewelry and silversmithing design come from man's real and imagined experiences and his conceptions of the flora, fauna, land forms, and geometric patterns that form his environment.

Historically, evidence of these sources has been found in artistic renderings of all cultures, and these sources provide infinite possibilities for art forms. The student should be encouraged to draw upon them when planning his work.

The beginning jewelry student may tend to borrow ideas from traditional jewelry forms or from something he has seen and wishes to replicate. The technical skills which are developed to produce these forms are of value as a basis upon which to build confidence in one's abilities to effectively use the materials available. The familiar and accepted forms lend a sense of security as different media are attempted.

The teacher should encourage the student to draw upon his personal interests and abilities, and should assist the student with the technical information necessary to develop confidence. Most students are capable of accomplishments far beyond the mediocre and the stereotyped and will produce excellent work if it is expected of them.

Consultation and planning between teacher and student are necessary to avoid the "hurry up and get into the material" attitude which can prove disastrous. This planning may entail drawing a series of sketches to scale or proportion, assembling or rearranging a model of the piece using paper, bristol board, or other suitable material, or preparing a clay model. The examination and evaluation in the planning stages by the student and the teacher through a careful review of the student's ideas, the function or purpose of the piece, and the relationship of its parts to the whole, will provide positive approaches to the development of the piece. An outline of student goals and how they can be accomplished should evolve from the planning and questioning. A simple approval or disapproval on the part of the teacher is not enough; a total understanding of the project should be communicated between student and teacher.

Reference to other works of the past or present may provide a wealth of information regarding possible accomplishments, use of materials, arrangement of forms, and the effects of cultural influences.

Materials

The range of materials which may be used will depend on the resourcefulness of the instructor and students, and on the budget allocation.

- While gold is expensive it is not out of the question, for old pieces of gold jewelry may be melted down and cast. Antique shops and jewelers may have damaged or broken pieces for a lesser price.
- Silver may be acquired from the same sources as gold or ordered from supply houses. Care should be taken in checking the hallmark.
- Copper, brass, and pewter are less expensive and more available. Copper and brass foils may also serve the need as both are easily embossed, etched, or chased. and copper foil may be enameled.
- Metals may be combined with many other materials such as wood, plastic, bone, fabric, feathers, fur, reed, ceramics, and glass.

Basic Techniques

Some basic techniques and skills which may be demonstrated as a foundation for jewelry and silversmithing are:

sawing	oxidizing
filing	polishing
drilling	buffing
emerying	wire drawing
soldering	forging

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Methods

Primary methods of executing pieces might include:

- pierced forms
- pierced forms soldered to a base metal
- flat pieces soldered to a base
- appliqué with wire, domes, beads
- forming or bending of any of these

Suggested Areas of Exploration

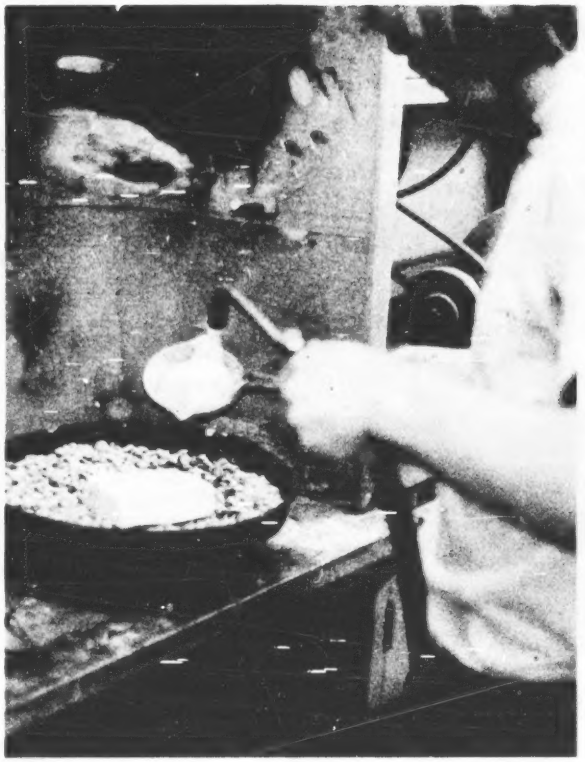
Casting

Casting is the technique of transferring a wax or easily burned-out model into metal. Casting procedures can be highly sophisticated or relatively simple.

- *Open mold casting* can be accomplished by fashioning wooden molds and pouring molten pewter (which melts at a low temperature) into the mold.
- *Piece mold casting* can be accomplished by cutting the desired form from sections of cuttlefish, joining the cuttlefish sections, and pouring in molten metal.
- *Sand casting* also employs separate mold sections: an original model must be impressed into special casting sand and then removed so that the molten metal can be poured into the hollow left by the model.
- *Lost wax investment casting* may be accomplished by gravity pouring of the molten metal, or with the use of a centrifugal casting machine, or by steam pressure.

  When wax is used for the model, a burnout kiln is necessary for the wax removal. If the model is of styrofoam, the direct pouring of the molten metal will remove the styrofoam and no burnout is necessary.

  Investment and wax may be purchased from dental laboratories. Secondhand centrifugal casting machines may sometimes be secured from dentists. The centrifuge can be mounted inside a galvanized bucket which is clamped to a steady surface for safety.
- *Steam casting* requires a kiln for burnout, and an asbestos liner must be used in the enlarged space opening to contain the metal which may be melted with an air acetylene torch.



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Chasing and Repoussé

- Embossing and low-relief modeling may be accomplished by chasing and repoussé. *Chasing* is executed from the front side of the metal; *repoussé* from the back side.
- Chasing tools may be made from steel nails, and both copper and brass are excellent to use. Metal of 18-gauge or thinner is suggested for beginners.

Enameling

- *Limoges* is the direct painting, sprinkling, or dusting of enamels onto the metal surface. Stencils and sgraffito may be experimented with.

- *Cloisonné* is a technique whereby colors are enclosed in cells. Enamels are separated by wire, or pierced pieces are appliquéd to a base and the openings filled with enamel.
- *Champlevé* is a technique whereby etched, chased, or stamped areas are filled with enamel.
- *Basse-taille* is a method whereby transparent enamels are used over an embossed or low-relief metal surface.
- *Plique-a-jour* is a stained glass window effect. Pierced areas of metal are filled with transparent enamel to allow the light to pass through.
- A front-loading enameling kiln is more desirable than the dome-shaped oven style. The front-loading kiln can also serve to test ceramic glaze tiles and can be used as a burnout kiln for investment casting.

Etching

Surface textures and designs may be executed on metal by means of an acid and acid-resistant varnish or wax. The resistant is used to protect all areas of the metal that are not to be eaten away by the acid. A solution of one part nitric acid to two parts water is recommended. The chemistry department may be a source for nitric acid.

Hollow Ware

Hollow ware may be executed by sinking, stretching, raising, or constructing a piece with seams.

- *Sinking* is the hammering of thin metal into a wooden mold or a depression in a tree stump with a ball peen hammer.
- *Stretching* is the thinning out of a thick piece of metal by squeezing it between an anvil or stake and a hammer.
- *Raising* is the shrinking of a thin sheet of metal larger than the plan of the finished object by hammering it with a cross peen hammer in concentric lines onto a metal or wooden T-stake without thinning it out.
- *Construction* is the joining of flat or formed sheets of metal by the use of seams.
- If metal stakes are not available, hardwood stakes can be handmade and substituted. An inexpensive way of acquiring ball peen and raising hammers is to purchase plastic hammers or mallets and to grind the faces to the desired shape. Subsequent nicks and mars can easily be removed.
- Pewter, brass, and copper are less expensive to use than gold and silver for producing hollow ware.

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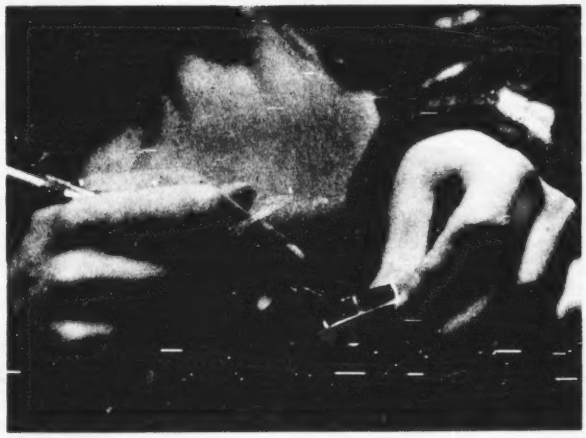
Stone Setting

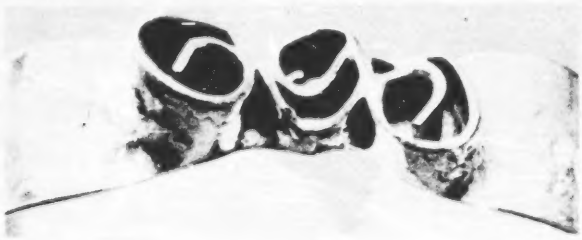
- A *bezel setting* (collar of metal securing the stone) is advisable for cabochon cut stones.
- A *prong setting* is desirable for faceted cut stones.
- A *pin setting* works well for half-drilled pearls or beads.
- A *gypsy setting* may be employed if casting is done.

Evaluation

Evaluation calls for an assessment of the challenges that have taken place and the work that has been accomplished. It may involve the student, his peers, the teacher, and the work itself.

- Craftmanship may be one factor in evaluation and refers to the technical skills used in fashioning a piece. Skills to be considered are sawing, filing, emerying, buffing, soldering, or any other techniques employed. The degree of competence demonstrated in the execution of these skills will depend on the student's experience and capabilities, as well as the materials used.
- Design is another factor to be evaluated. It involves the relationship of all the components of a piece to each other and to the whole. Consideration should be given to how the parts relate, complement, emphasize, distract, focus, move, balance, and unify the whole in relation to the concept behind the piece.
- Function and purpose are also factors in evaluation, and the approach to these will depend on the student's original ideas. Consideration might be given to such factors as:
  - — does it pour without dripping?
  - — does it close smoothly and fasten?
  - — does the pin or fastener work without tearing or abrading?
  - — does it have balance?
  - — is it too heavy or too light for its purpose?
- The procedural stages in the fashioning of a piece, the personal satisfaction that a student receives, and the total experience are difficult to measure. The student should be encouraged to assess his development both during the execution of a piece and at the conclusion. The reapplication and expansion of what the student has learned are also important considerations for evaluation.





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Glossary of Terms

B & S gauge flat, circular steel plate with slots of various sizes on the outer edge; used to measure the thickness of metal.

bezel collar or band of metal used to hold a stone

brass alloy of copper and zinc

burnisher highly polished, tapered steel form with wooden handle; used to polish metal

cabochon a smooth stone shape that is round or oval

chasing modeling metal from the front side with chasing tools

chasing tools steel cylinders with smooth ends of various shapes; used to model metal

cuttlefish dried shell of a marine mollusk; used as a mold for casting

dapping block steel cube with graduated concave domes in the surface

dapping punches steel cylinders with dome tops

draw plate steel plate with graduated hole sizes (round, half round, square, rectangle); used to change the shape of wire

draw tongs pliers used to pull wire through a draw plate

etching applying surface ornamentation to metal through the use of acid and an acid resistant

facet flat surface on a crystal or stone

file card wooden form with metal teeth to clean files

forging forming hot metal by hammering it on an anvil with a cross peen hammer

gum tragacanth solution used to adhere enamels to metal surface

gypsy metal base hammered around a stone to hold it in place

investment a combination of plaster of paris and quartz; used to make a mold for casting

pitch mixture of plaster of paris, tallow, and pitch; used as a support when chasing or repousséing

planishing process of smoothing metal surface with a flat or slightly round-faced hammer

prong wire projection used to hold a stone in place

repoussséing modeling metal from the back side with chasing tools

ring clamp wooden hand vise with wedge for holding metal

ring gauge graduated steel rings used to measure finger size

ring mandrel tapered steel cylinder used to measure ring sizes

rouge iron oxide and grease used to buff metal

sterling silver alloy of 92½% silver and 7½% copper

tripoli silicon substance and grease used to polish metal

Basic Tools and Equipment

The amounts needed will depend on the class size and the extent of the program.

abrasive paper (#320, #400, #600)
acetylene torch
alcohol lamp or candles
annealing tray
asbestos
asbestos gloves
aviation shears
B & S wire gauge or American Standard gauge
ball peen hammer
bench grinder (with attachments for polishing and buffing)
bench pins (can be homemade)
bench vise
binding wire
borax
burnisher
C-clamps
centrifuge (or use steam-casting method)
charcoal blocks and firebrick
chasing hammer
chasing tools (can be made from steel nails)
cross peen hammer
dapping block and punches
dividers
draw plate
draw tongs
enamels (80 mesh)
enameling kiln
enameling rack and fork
file card
findings
flexible shaft and motor
gum tragacanth
hand files (three square, half round, rasp)
investment materials
jewelers saw frames
lead solder
liver of sulfur
needle files (#2 cut half round, round, three square, equaling, crossing)
nitric acid
pitch
planishing hammer
pliers (round nose, forming, flat nose, chain nose, side cutting)
propane torches
pumice
rawhide mallet
ring clamp
ring gauge
ring mandrel
rouge
saw blades (Nos. 1/0 and 2)
silver solder (sheet, wire, clipped forms)
steel wool
sulphuric acid
tripoli
tweezers
twist drills (80¼)
universal shears
wax

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Historical Books

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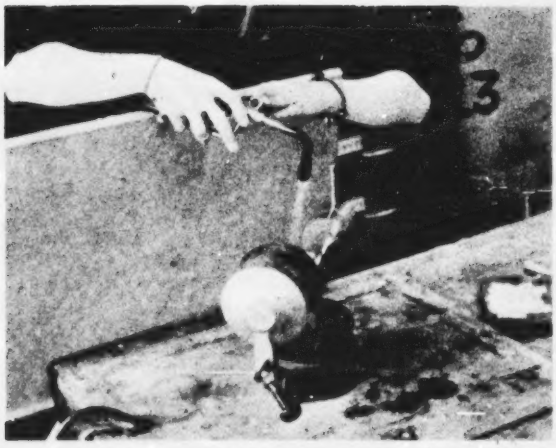

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Ritual Bronzes of Ancient China, Phyllis Ackerman. Dryden Press, New York, 1945.

Treasures of the Churches of France, Jean Taralon. G. Braziller, New York, 1966.

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Sources of Materials and Equipment

Jewelry tools and findings

Allcraft Tool & Supply Co.
315 Park Avenue
Hicksville, New York

American Handicraft Co.
20 W. 14th Street
New York City, New York

Anchor Tool
12 John Street
New York City, New York

Arthur Brown & Bro.
2 West 46th Street
New York City, New York

William Dixon
32 E. Kinney Street
Newark, New Jersey

Paul Gesswein
35 Maiden Lane
New York City, New York

T. B. Hagstoz & Son
709 Sansom Street
Philadelphia, Pennsylvania

Hardware Stores

Local Stores

Gold and Silver

Goldsmith Brothers
111 N. Wabash Avenue
Chicago, Illinois

T. B. Hagstoz & Son
709 Sansom Street
Philadelphia, Pennsylvania

Handy and Harman
850 3rd Avenue
New York City, New York

Rodman and Yarus
21 West 47th Street
New York City, New York

Copper and Brass

William Dixon
32 E. Kinney Street
Newark, New Jersey

T. B. Hagstoz & Son
709 Sansom Street
Philadelphia, Pennsylvania

Casting Supplies

T. B. Hagstoz & Son
709 Sansom Street
Philadelphia, Pennsylvania

Jewelry Casting Equipment
20 W. 47th Street
New York City, New York

I. Shor
64 W. 48th Street
New York City, New York

Enamels

American Handicraft Co.
20 W. 14th Street
New York City, New York

Thomas C. Thompson
1539 Deerfield Road
Highland Park, Illinois

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